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ABSTRACT

A survey was conducted during January and February of 1984 to ascertain the continuing education/training needs of personnel working in water utility and wastewater systems in Wisconsin. From the estimated 4,000 certified operators in water utilities, waste water treatment plants, and plant superintendents surveyed, 723 (18 percent) completed questionnaires were processed for this report. Conclusions about the respondents, water utilities, and wastewater systems in general include the following: (1) nearly half of the respondents worked in wastewater systems only, while about one-fourth each worked in water utility systems only and in both water utility and wastewater systems; (2) more than 90 percent of respondents had taken at least one course relevant to their job, with more than half having taken it within the last two years; (4) the 12 hours of continuing education required every two years for recertification were endorsed as "about right" by about 80 percent of the respondents; (5) technical subjects were the most frequently desired to improve operations, while general subjects were the most commonly desired for personal development; (6) the most highly desired areas for training in water utility subjects were preventive maintenance, leak detection and repair, emergency and cold weather operations, water meter testing, safety, and electricity; (7) the most highly desired training areas in wastewater subjects were preventive maintenance, cold weather operations, flow measurement, equipment, inflow identification, shock loads, and toxicity problems; (8) certification ranked relatively low as a reason for desiring training; and (9) respondents wanted hands-on training by experienced personnel close to home. Recommendations were made to fill the training needs identified. (Findings are also given by district.) (KC)

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CONTINUING EDUCATION/TRAINING NEEDS
OF
WATER UTILITY & WASTEWATER WORKS PERSONNEL
IN
WISCONSIN

Report of a Cooperative Statewide Survey

1984

Co-Sponsored by:

American Water Works Association (Wisconsin Chapter)
University of Wisconsin Extension
University of Wisconsin - Stout
Wisconsin Board of Vocational, Technical and Adult Education
Wisconsin Department of Natural Resources
Wisconsin Vocational, Technical and Adult Educational Services District Consortium
Wisconsin Wastewater Works Operator's Conference, Inc.

Madison, Wisconsin

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FOREWORD

Technological change, population trends, and individual wants and needs are mandating an increasing need for states to monitor, protect, and preserve our natural resources; and to provide for the health, safety, and general welfare of our people.

The future quality of our water resources is dependent upon the protective laws of the state and the qualifications of the personnel employed to administer and execute them.

This document contains findings and results of a study of the needs for training and continuing education of personnel employed in public and private water works and wastewater treatment plants in the state of Wisconsin.

The report should be used to facilitate the cooperative development of relevant curriculum materials, and in the coordination of the delivery of instruction to meet the identified needs.

The Advisory Committee

ACKNOWLEDGMENTS

Consistent with the need to keep abreast with technological change and other challenges, the Water/Wastewater Advisory Committee requested a statewide study of the needs for training and continuing education of water and wastewater personnel in the State.

Without the assistance, cooperation and expertise of many persons in several organizations, this study could not have been completed.

Appreciation is extended to the over 750 operators, laboratory technicians, superintendents, maintenance, and other personnel who took the time to respond to the questionnaire.

Thanks and appreciation are also extended to the following for the tedious task of typing and duplicating drafts of the questionnaire and final report: Joyce Kasten and Helen Dobrovolny of the Wisconsin Board of Vocational, Technical and Adult Education; Second Floor Word Processing Staff of the Wisconsin Department of Natural Resources; and Mary Weber of the University of Wisconsin-Stout for entering the questionnaire data into the computer.

Appreciation is extended to the several individuals who were involved in the development of the questionnaire: Brian Barrett, Nancy Mann, Roland Krogstad, Al Linster Tom Mickelson, Tom Mugan, Orville Nelson, Ralph Spalding, Mary Ver Voort, Ronald Wilhelm, and others in the various agencies and groups involved.

The Water/Wastewater Advisory Committee

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- EXECUTIVE SUMMARY -

This study of the educational needs of personnel in water and wastewater works in Wisconsin was requested by a joint advisory committee. It was conducted cooperatively between American Water Works Association (Wis. Chapter), UW-Extension, UW-Stout, Wisconsin Board of VTAE. Wisconsin Department of Natural Resources, Wisconsin Vocational, Technical and Adult Educational Services District Consortium and the Wisconsin Wastewater Works Operators' Conference, Inc.

The objectives of the study were to identify:

1. Training and continuing education needs of water utility and wastewater works personnel in various job classifications;

2. Current and desired certification subgrades of water utility and wastewater works personnel in various job classifications;

3. Scheduling, delivery agencies, and methods of instruction preferred by water utility and wastewater works personnel; and

4. Report the findings, conclusions, and recommendations for continuing education and training of water utility and wastewater works personnel.

A questionnaire was mailed during January, 1984 to approximately 4,000 certified operators in water utilities, wastewater treatment plants, and plant superintendents. About 1,025 (25 percent) were returned. However, about 300 of those returned were not used because the addressees were not located, or the questionnaires were either incomplete or were received too late to be included in the data processing procedures. A total of 723 completed questionnaires are used in this report.

Personnel working in "wastewater systems only" constituted the largest work group (41 percent), followed by those in "both water utility and wastewater systems" (28 percent), "water utility systems only" (25 percent), and five percent not working in either water utility or wastewater systems.

Those employed in "both water utilities/wastewater systems" checked the job title of "superintendent" and "maintenance" at higher rates (48 and 26 percent, respectively) than the other employment groups. Laboratory Technician received the lowest ratings from those employed in water utilities only (3 percent) and those not working in either water utility or wastewater systems (3 percent). This latter group also indicated the highest rate of "other" job titles (49 percent).

On the questionnaire list of training subjects, the respondents indicated their most important reason for desiring the training within the next three years such as: (1) for certification, (2) to improve operations, or (3) for personal development. They also indicated their current and desired certification grades and/or subgrades.

Desired Water Utility Training and Certification

Personnel working in "water utilities only" and/or "both water utilities and wastewater systems" desired training in water utility subjects. On a statewide basis, the water utility subjects/topics receiving the highest response for training desired to improve operations were ranked:

- Preventative Maintenance
- Leak Detection and Repair
- Pumping Equipment and Controls
- Pumping Equipment Maintenance
- Distribution Systems Maintenance
- Emergency Operations
- Unaccounted-for Water
- Cold Weather Operations
- Distribution Systems
- Water Meter Testing
- Water Meter Maintenance and Repair

In waterworks certification, the subgrades of Iron Removal (I) and Surface Water (S) were the most frequently desired.

Response rates and rankings varied among the VTAE and DNR districts.

Desired Wastewater Training and Certification

Personnel working in "wastewater plants only" and/or "both wastewater and water utility systems" desired training in wastewater subjects. On a statewide basis, the wastewater subjects/topics receiving the highest response for training desired to improve operations were ranked:

- Lift Station Maintenance/Troubleshooting
- Cold Weather Operations
- Preventative Maintenance
- Collection System Maintenance
- Flow Measurement
- Wastewater Pumping Equipment
- Collection Systems
- Infiltration & Inflow Identification
- Shock Loads & Toxicity Problems
- Corrective Maintenance

In wastewater certification, Grade 4 for Activated Sludge (C), Disinfection (E), and Laboratory (J) were the most frequently desired.

Response rates and rankings varied among the VTAE and DNR districts.

Conclusions

Conclusions about the respondents in general include the following:

1. The twelve hours of continuing education required every two years for recertification was endorsed as "about right" by about 80 percent of the respondents.

2. Most of the respondents had taken at least one course relevant to their job, and over half had taken it within the last two years.

3. Over 90 percent of all respondents had completed Grade 12 or higher.

4. From a half to two-thirds of the personnel had been employed in municipal systems between 2-14 years.

5. Slightly over half of the respondents who were working in the systems reported their job title/classification as "operator."

Conclusions relative to objective one (training needs) include the following:

6. Technical subjects were the most frequently desired to improve operations, while general subjects were the most commonly desired for personal development.

7. The most common technical topics desired were in the areas of maintenance, operations, and repair, while the most commonly desired general subjects included problem-solving, communications, supervision and leadership skills.

8. Superintendents of water utilities indicated top training needs for various categories of personnel as sampling techniques, preventative maintenance, safety, employee/employer relations, DNR requirements, and orientation of elected officials.

9. Superintendents of wastewater systems indicated top training needs for various categories of personnel as quality assurance, safety, preventative maintenance, budget preparation, employee relations, and orientation of elected officials.

10. Superintendents of both/combined systems indicated top training needs were basic lab testing procedures, certification training, preventative maintenance, budget preparation, leadership skills and orientation of elected officials.

11. The use of microcomputers in water utility and wastewater systems ranked in the top 20 among some reporting groups and some VTAE districts.

12. The least desired water utility subject was lime softening systems, and the least desired wastewater subject was trenching.

Conclusions relative to objective two (certification/subgrades) include the following:

13. Certification ranked relatively low as a reason for desiring training.

14. Current certifications in waterworks subgrades were relatively high for Groundwater (G) and Distribution (D) among personnel working in "water utility systems only" and "both water utility and wastewater systems", but 15 percent or less of the respondents desired certification in any one of the six subgrades.

15. Current certifications in wastewater grades and subgrades were relatively equally distributed at a relatively low rate throughout the four grades and eleven subgrades among personnel working in "wastewater systems only" and "both wastewater and water utility systems", and 25 percent or less desired certification in any one of the four grades or eleven subgrades.

Conclusions relative to objective three (delivery methods) include the following:

16. Respondents want hands-on training by experienced personnel close to home.

17. The most common suggestions for orientation/training of elected officials were tours of facilities, talking to the workers, making presentations at their meetings, and encouraging them to gain understanding of the operations and familiarization with governmental regulations.

Recommendations

Because of the changing technological advancements in water/wastewater systems; the differences in training, experience and qualifications of personnel; and the variety of conditions and demands for these systems throughout the state; further identification of specific training and certification needs may be necessary. This document can be used as a resource by individuals and advisory committees during the delineation of specific needs, establishment of priorities, and the development of plans to meet these needs and priorities in their respective areas of responsibilities. They should analyze the data and,

Relative to objective one (conclusions 6-12):

1. Plan and conduct the training most desired and needed.

2. Assess the implications for using microcomputers/computers in water utility and wastewater systems and implement training in their expanding applications.

Relative to objective two (conclusions 13-15):

3. Evaluate disparities between current and desired subgrade certifications of water utility and wastewater personnel and implement needed training in the various job classifications.

Relative to objective 3 (conclusions 16-17):

4. Customize training content and delivery methods to better meet the needs of personnel working in systems of various sizes.

5. Schedule training sessions at different locations to facilitate the participants' learning from a variety of systems.

6. Use experienced instructors and "hands-on" methods of instruction wherever possible.

7. Explore the development of a statewide orientation and training package for elected officials.

8. Review the supply and qualifications of trainers and provide/develop necessary professional development opportunities for them.

I.

INTRODUCTION

Background: Every state must take steps to: (1) Protect and preserve its natural resources, (2) Protect the health and safety of its people, and (3) Provide for the education of its citizens.

The Wisconsin Department of Natural Resources (WDNR) through its six districts is one of the state agencies charged with the protection and preservation of the state's natural resources including air, land and water. It is also charged with protection of health and safety of the people. One of the goals of the Technical Services Section is to insure that municipal waterworks and wastewater treatment plants are operated to maintain water quality standards.

The Wisconsin Board of Vocational, Technical and Adult Education (WBVTAE) through its 16 VTAE districts is responsible for the initiation, development, maintenance and supervision of programs with specific occupational orientations below the baccalaureate level, including terminal associate degrees, training of apprentices, and adult education below the professional level.

The Wisconsin Vocational, Technical and Adult Educational Services District Consortium is composed of 15 postsecondary VTAE districts. Its current organization was formed during the 1960's to facilitate coordination and cooperation in the provision of curriculum and instruction for apprentices, occupational extension and other instructional areas.

The University of Wisconsin (UW) System has a broad mission of instruction, research, and public service in the disciplines and professions traditionally associated with higher education. UW - Stout is one of the 13 four-year campuses.

The University of Wisconsin - Extension (UWEX) system has a statewide mission in coordinating University System resources to deal with public concerns, such as energy, environmental protection, health, business development, land use, agriculture, urban planning and others.

The Wisconsin Wastewater Works Operator's Conference, Inc. (WWWOC) is an association of personnel working in municipal and industrial wastewater treatment plants. It was formed several years ago to protect the welfare and facilitate the training and professional development of its members.

The Wisconsin chapter of the American Water Works Association (AWWA) is an association of personnel working in public and private water supply systems. It was formed several years ago to to protect the welfare and facilitate the training and professional development of its members.

A joint Water/Wastewater Advisory Committee is composed of representatives from the above groups. It was formed during the 1970's to facilitate: (1) The identification of needs for training and personnel development, (2) The development of relevant curriculum materials, and (3) The coordination of instruction.

At its August 30, 1983 meeting, the Advisory Committee indicated a need to "find a way to conduct needs assessments of the operators .... and to determine feasibility of conducting a state study." At its next meeting, the committee agreed to conduct a cooperative statewide study.

Problem/Need: Approximately 580 municipal waterworks are required by 144.025 (2) (1), Wisconsin Statutes, to have a certified operator in charge of the facility's technical operation. Approximately 660 municipal and 130 industrial wastewater treatment plants are also required by 144.025 (2) (1), Wis. Stats., to have a certified operator in charge of the facility's technical operation. Although not required by law, entry level training is needed in order for most new operators to obtain the knowledge and skills needed to operate their facility and pass the certification exams. In addition, existing certified operators are required by NR 114, Wisconsin Administrative Code, to obtain 12 hours of continuing education every two years.

This training has been provided by VTAE schools, DNR operator instructors, operator groups, UW - Extension, equipment suppliers, AWWA, WWWOC, VTAE Consortium, and others through various modes of delivery, such as individual classes, Educational Telephone Network (ETN), Statewide Extension Education Network (SEEN), seminars, short courses, conferences, and other means of delivery.

There is evidence that some classes are poorly attended and that some courses may not be meeting the training needs of the personnel required to attend. Although some local surveys have been conducted, no comprehensive statewide assessment of training and continuing education needs of all water utility and wastewater personnel has been conducted in Wisconsin within the past 15 years.

The basic questions addressed in this study include:

1. What are the substantive training and continuing education needs of the personnel in the various job classifications in the water utility and wastewater works systems in Wisconsin?
2. What is the preferred scheduling, duration of sessions, and methods of instruction?
3. What are the disparities between the current and desired certification grades and subgrade levels among personnel working in the systems?

Purpose/Objectives: The overall purpose of this study was to ascertain the needs for training and continuing education of water utility and wastewater works personnel. Objectives were:

1. Identify training and continuing education needs of water utility and wastewater works personnel in various job classifications.
2. Identify current and desired certification subgrades of water utility and wastewater works personnel in various job classifications.
3. Identify scheduling, delivery agencies, and methods of instruction preferred by water utility and wastewater works personnel.
4. Develop a report of findings, conclusions and recommendations for continuing education and training of water utility and wastewater works personnel.

II.

METHODOLOGY/PROCEDURES

The joint Water/Wastewater Advisory Committee at its August and October, 1983 meetings approved the conduct of this statewide study. It was a mailed questionnaire type survey.

The Questionnaire: Staff from WDNR and WBVTAE reviewed curriculum outlines and certification requirements to assist in the development of the questionnaire. Staff from UW - Stout, WDNR, WBVTAE, the WVTAE District Consortium and local representatives of the American Water Works Association and the Wisconsin Wastewater Works Operator's Conference, Inc. were also involved in the development of the questionnaire. The questionnaire (Appendixes A-D) contained four components: (1) Form A - General Information, (2) Form B - Water Utility, (3) Form C - Wastewater, and (4) Form D - Superintendents. A Likert-type response was incorporated into Forms B and C to indicate reasons for desiring training. Form D required an open-ended response from plant superintendents to indicate what they felt were the most critical training needs for personnel of various job classifications in their respective plants. Approximately 4,000 questionnaires were prepared and mailed by WDNR in January 1984.

Population/Sample: It was mutually decided to survey 100% of three populations. The populations included personnel on the DNR mailing lists of certified operators in water utilities, wastewater treatment plants, and plant superintendents. In addition, questionnaires were mailed to all plant superintendents who may not have been included in the certified operators' lists.

Processing: Completed questionnaires were returned to the Research Coordinating Unit (RCU) of the WBVTAE for preliminary tabulations and then forwarded to the Center for Vocational, Technical and Adult Education (CVTAE) at UW - Stout for data entry and computerized data processing. Computer printouts were returned to the RCU for analyses and incorporation into the final report. The RCU distributed several copies of the report.

STATEWIDE FINDINGS/RESULTS

III.

STATEWIDE FINDINGS/RESULTS - GENERAL INFORMATION

This section includes highlights and a summary of statewide results from completed Form A, General Information, of the 723 questionnaires used in this report.

Of the estimated 4,000 questionnaires mailed, about 1,025 (25%) were returned. However, about 300 of those returned were not used because the addressees were not located, or the questionnaires were either incomplete or were received too late to be included in the data processing procedures. If the 723 usable returns are representative of the 4,000 population, the statewide data would vary between a plus or minus four percent error.

Table 1 indicates that a total of 723 completed questionnaires are used in this report. Personnel working in "wastewater systems only" constituted the largest work group (41%).

Table 1

STATE TOTAL NUMBER (N) AND PERCENT (%) OF RESPONDENTS
BY EMPLOYMENT/WORK STATUS (Q2)
(% does not add due to rounding)

Employment/Work Status	Respondents	
	N	%
Work in Water Utility System Only	183	25
Work in Wastewater System Only	298	41
Work in Both Water Utility and Wastewater Systems	203	28
Not Working in Either Water Utility or Wastewater System	39	5
TOTAL	723	99 (rounded)

Table 2 indicates that personnel employed in "both water utilities/wastewater systems" checked the job title of "superintendent" and "maintenance" at higher rates (48% and 26%, respectively) than the other employment groups. Laboratory Technician received the lowest ratings from those employed in water utilities only (3%) and those not working in either water utility or wastewater systems (3%). This latter group also indicated the highest rate of other job titles (49%).

Table 2

JOB TITLE/CLASSIFICATION BY EMPLOYMENT/WORK STATUS (Q2, Q3)

Employment/Work Status	Job Title/Classification (a)									
	Superintendent		Lab Technician		Operator		Maintenance		Other	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
Water Utility System *	49	27	6	3	97	53	28	15	43	23
Wastewater System*	82	28	49	16	152	51	46	15	74	25
Both Water Utility & Wastewater Systems	98	48	30	15	116	57	52	26	29	14
Not Working in Either *	2	5	1	3	12	31	6	15	19	49

(a) Ch = checks. Multiple checks permitted. Percent (%) based on N from Table 1, not on total checks.

* To facilitate reporting, the phrase "Water Utility" or "Water Utility System" will refer to personnel working in "Water Utility Systems Only" and "Wastewater" or "Wastewater System" will refer to personnel working in "Wastewater Systems Only" to differentiate from personnel who reported they worked in "Both Water Utility and Wastewater Systems." "Not working in Either" will refer to those who reported they were not working in either water utility or wastewater systems.

Table 3

"OTHER" JOB TITLE/JOB CLASSIFICATION BY WATER UTILITY PERSONNEL (Q 3.5)

(2 or more responses indicated in parenthesis)

- Foreman (5)
- Manager (4)
- Engineering (3)
- Maintenance Supervisor/Foreman (3)
- Meter Records/Repair/Tester (3)
- Assistant Superintendent (2)
- Chief Serviceman (2)
- Chief Waterworks Operator (2)
- Power Plant Superintendent (2)
- Water Supply Supervisor (2)

Please refer to further individual job titles in the findings for each VTAE district.

Table 4

"OTHER" JOB TITLE OR JOB CLASSIFICATION BY WASTEWATER PERSONNEL (Q 3.5)

(2 or more responses indicated in parenthesis)

- Shift Operator (9)
- Supervisor (8)
- Operator Foreman (6)
- Manager (6)
- Technical Director (3)
- Chief Engineer and Director (3)
- Project Engineer/R & D/Civil
- Sanitary Engineer (3)
- Engineering Draftsman/Technician (3)
- Laboratory Supervisor/Manager (3)
- Chief Operator (2)

Eight job titles received two responses, several others one. Refer to findings for each VTAE District for additional job titles.

Table 5

"OTHER" JOB TITLE OR JOB CLASSIFICATION BY PERSONNEL WORKING IN BOTH WATER UTILITY & WASTEWATER (Q 3.5)

(Frequency of responses in parenthesis)

Superintendent/Supervisor/Manager/
 Administrator (6)
Director of Public Works (3)
City/Village Engineer (3)
Part-Time Operator (3)
Commissioner of Public Works (2)
Maintenance Superintendent (2)
Operator (2)

Several others had one response: department head, municipal aide, foreman, street superintendent, assistant operator, village employee, city clerk, technician, chairman - sanitary district.

Table 6 indicates that personnel working in both water utilities and wastewater systems worked at the highest rate (35%) in the 11-34 hours per week category and the second lowest (46%) at the 35 hours or more category.

Table 6

NUMBER OF HOURS WORKED AT ABOVE JOBS PER WEEK (Q4)

Employment/Work Status	Hours Worked per Week (a)					
	10 Hours or less		11-34 Hours		35 Hours or more	
	N	%	N	%	N	%
Water Utility System	29	16	25	14	129	70
Wastewater System	38	13	44	15	215	72
Both Water Utility/Wastewater	37	18	71	35	94	46
Noth Working in Either	8	21	3	8	16	41

(a) Rows don't add due to some omits

No explanation is offered as to why those who indicated they were not working in either water utility or wastewater systems reported various hours worked. Although some of these were enrolled in school and some may have been employed in private industry systems.

Table 7 indicates that water utility personnel appeared to be employed for 15 years or more at the highest rate (46%) while the other two working groups had the highest ratings in the 2-14 years category. The "not working" group had the highest rate in the less than two years (23%).

Table 7

NUMBER OF YEARS EMPLOYED IN MUNICIPAL WATER/WASTEWATER SYSTEMS (Q5)

Employment/Work Status	Number of Years (a)					
	Less than two		2 - 14 years		15 years or more	
	N	%	N	%	N	%
Water Utility System	6	3	91	50	84	46
Wastewater System	24	8	205	69	66	22
Both Water Utility/Wastewater	16	8	134	66	52	26
Not Working in Either	9	23	8	21	13	33

(a) Rows don't add due to some omits

Table 8 indicates that 63% of the 203 personnel (see Table 1) working in both water utilities and wastewater systems had completed grade 12 and 47% of the "not working" had attained grade 16 or higher.

Table 8

HIGHEST GRADE OR YEAR OF SCHOOL COMPLETED (Q6)

Employment/Work Status	Highest Grade/Year Completed									
	Some Elementary		Some High School		H. S. Grade 12		Post H.S. 13-14-15		Post H. S. 16-17+	
	N	%	N	%	N	%	N	%	N	%
Water Utility System	6	3	9	5	97	53	38	21	29	16
Wastewater System	5	2	10	3	98	33	76	25	106	35
Both Water Utility/Wastewater	9	4	7	3	127	63	38	18	22	11
Not Working in Either	2	5	0	0	10	26	9	23	18	47

Table 9 indicates that 70% of the wastewater personnel had taken biology, while only 14% of the both groups had taken bacteriology.

Table 9

SUBJECTS/COURSES TAKEN DURING OR AFTER HIGH SCHOOL (Q7)

Employment/Work Status	Subjects/Courses Taken (a)											
	Physics		Chemistry		Mgt./Sup.		Biology		Bacteriology		Engineering	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
Water Utility	61	33	93	51	65	36	97	53	25	14	41	22
Wastewater System	142	48	202	68	133	45	210	70	87	29	68	23
Both Water Utility/ Wastewater Systems	67	33	96	47	57	28	110	54	28	14	31	15
Not working in Either	22	56	26	67	18	46	23	59	14	36	11	28

(a) Ch = checks (responses). Multiple checks permitted. Percent (%) based on N in Table 1, not on total checks.

Table 10

"OTHER" MOST RECENT EDUCATION/OR TRAINING RECEIVED RELEVANT TO JOB BY WATER UTILITY PERSONNEL (Q 8)

(3 or more responses indicated in parenthesis)

Water Works Operator Course (28)
Ground Water and Distribution (18)
Management/Supervision (15)
Electrical/Electronics (9)
Water Works Lab (7)
Flouridation and Equipment (4)
Water and Wastewater (4)
Surface Water (4)
Water School (3)
Pump Operation and Maintenance (3)
Water Management/Quality (3)
Zeolite Softening (3)
Iron Removal (3)
Business Management/Marketing (3)

Several responses merely indicated conferences, ETN, or seminars.

Six topics received 2 responses, e.g., cold weather operations, cross-connections, engineering, use of computers in water utility, chlorination, and water products.

Please refer to further listings in the findings for each VTAE district.

Table 11

MOST RECENT FORMAL EDUCATION OR TRAINING RELEVANT TO JOB BY WASTEWATER PERSONNEL (Q 8)

(2 or more responses)

Wastewater operator training/courses/certification (64)
Activated Sludge (31)
Managemnt/supervision (27)
Laboratory (22)
Chemistry (14)
Quality Assurance (11)
Biology/Microbiology (10)
Civil Engineering (9)
Anaerobic digestion (7)
DNR conference/course (7)
Maintenance (7)
Ponds/lagoons (7)
Technology course at MPTI (6)
Pumps (5)
Bacteriology (4)
Business administration/financial management, accounting (4)
Phosphorus removal (4)
Electricity/electronics (4)
Disinfection (3)
Physics (3)
Chlorination (3)
Earth Science (3)

Ten topics received two responses, several received one response. Refer to VTAE District findings for further listings.

Table 12

MOST RECENT FORMAL EDUCATION OR TRAINING RELEVANT TO JOB BY BOTH WATER UTILITY/WASTEWATER PERSONNEL (Q 8)

(3 or more responses indicated in parenthesis)

wastewater works operations, treatment, training, certification (35)
Several courses, conferences (34)
Water works operations, training, certification (31)
Laboratory, quality assurance (10)
Maintenance, wells, pumps, distribution system (8)
Associate Degree in water/wastewater technology (7)
Management/Supervision (7)
Groundwater treatment (6)
Activated sludge (6)
Ponds and lagoons (5)
Civil Engineering/Environmental Engineering (5)
Iron removal and zeolite softening (3)

Several topics had two responses: Associate Degree in Municipal Engineering, Biology, Chemistry, Treatment plant math, Business administration, accounting, Disinfection, Cold weather operations, New products for water works, Government affairs, and Correspondence course.

Several topics had one response. Please refer to findings for each VTAE District.

Table 13 indicates that all four groups reported VTAE as the most common source of education/training relevant to their jobs, while 10% or less of the wastewater personnel and the "not working" group used the DNR conference.

Table 13

AGENCY/SCHOOL FOR MOST RECENT EDUCATION/TRAINING RECEIVED RELEVANT TO JOB (Q 8, Q 9)

Employment/Work Status	Agency/School (a)							
	VTAE		UWEX		DNR Conference		Other	
	Ch	%	Ch	%	Ch	%	Ch	%
Water Utility System	73	40	36	20	36	20	44	24
Wastewater System	161	54	48	16	31	10	35	29
Both Water Utility/Wastewater	120	59	30	15	41	20	30	15
Not Working in Either	23	59	6	15	3	8	7	18

(a) Ch = checks (responses). Multiple checks permitted. Percent based on N from Table 1, not on total checks.

Table 14

WHERE "OTHER" RECENT TRAINING RECEIVED BY WATER UTILITY PERSONNEL (Q 9.4)

(Number of responses in parenthesis)

Coventions (AWWA) (8)
ETN (3)
Michigan State University (3)
UW-Madison (3)
Contractor/Vendor (2)
Military (2)

Several institutions were mentioned once: Cardinal Stritch College, A California Junior College, Donaven School, Marquette University, MUEW, Ohio State University, UW-Rock County, UW-Stevens Point, UW-West Bend and U of Cincinnati.

Please refer to further listings in the findings for each VTAE district.

Table 15

WHERE "OTHER" RECENT TRAINING RECEIVED BY WASTEWATER PERSONNEL (Q 9.4)

(2 or more responses, VTAE and DNR not included)

- UW System (Eau Claire, Green Bay Madison, Medford, Milwaukee, Oshkosh, Parkside, Platteville, Stevens Point, Superior, Wausau, Whitewater) (26)
- University/College (6)
- Sacramento State University, California, correspondence (6)
- Self Study (6)
- Michigan State University (2)
- Marquette University (2)
- University of Illinois, Chicago (2)
- Bay de Noc Community College, Escanaba, Michigan (2)
- Company sponsored (2)

Please refer to further listings in the findings for each VTAE district.

Table 16

WHERE "OTHER" RECENT TRAINING RECEIVED BY PERSONNEL WORKING IN BOTH SYSTEMS (Q 9.4)

(Responses indicated in parenthesis, VTAE, UWEX, DNR not included)

UW System (5) (Madison, River Falls, Plattevilee, Whitewater)
Sacramento State University, California (3)
ETN (3)
WWWOC conference (3). Several "other" sources of training with one response were: AWWA conference, Northern Michigan University, Military Service, American Motors, W.P.C.F., Technical School, Neosha, Missouri, and On-The-Job Training.

Table 17 indicates that over half of each group received relevant education/training within the last two years, while about one-fifth of each group received training over five years ago.

Table 17

RECENCY OF EDUCATION/TRAINING (Q 10)

Employment/Work Status	Recency of Training					
	Within last two years		2-5 years ago		Over 5 years ago	
	Ch	%	Ch	%	Ch	%
Water Utility System	101	55	26	14	39	21
Wastewater System	161	54	70	23	50	17
Both Water Utility/Wastewater	101	50	41	21	37	18
Not Working in Either	22	56	5	13	9	23

Table 18 indicates that well over half of all groups felt the best way to find out about training courses was through VTAE announcements, while workers in the plant received the lowest ratings.

Table 18

BEST WAY(S) TO FIND OUT ABOUT TRAINING COURSES (Q11)

Employment/Status	Ways to Find Out															
	DNR Certified Operator		WWWOC Conference		AWWA Water Log		VTAE Announcements		DNR Operator/Instructor		One's Supervisor		Workers in Plant		Other	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
W.U. System	101	55	6	3	49	27	97	53	37	20	36	20	8	4	36	20
W.W. System	132	44	120	40	7	2	193	65	56	19	36	12	15	5	31	10
Both W.U./W.W.	87	43	62	31	34	17	145	71	50	25	5	2	2	1	28	13
Not Working	12	31	3	8	2	5	26	67	10	26	6	15	2	5	6	16

Table 19 indicates that from two-thirds to over 80% of the personnel in the four groups felt that the twelve hours of training required every two years for recertification was "about right," while 7% or less of the three "working" groups indicated it was "too much."

Table 19

ADEQUACY OF TWELVE HOURS OF TRAINING EVERY TWO YEARS (Q 12)

Employment/Work Status	Adequacy					
	Too Much		Not Enough		About Right	
	N	%	N	%	N	%
Water Utility	9	5	28	15	144	79
Wastewater System only	22	7	47	16	226	76
Both Water Utility and Wastewater Systems	12	6	26	13	165	81
Not Working in Either Water Utility or Wastewater	5	13	3	8	26	67

Chapter Summary

Of the four categories of employment/work status of the respondents, "Wastewater Systems Only" was the largest. Many different job titles/classifications were reported in all four groups. Most of the personnel worked 35 hours or more per week. A majority of them had been employed in municipal systems between 2-14 years. About half reported Grade 12 as the highest grade completed, while most of the remainder had completed years beyond high school. Many different courses or programs had been taken at many different institutions and locations, over half in last two years. VTAE announcements were the best way to find out about training. A large majority felt that the 12 hours of training required every two years for recertification was "about right."

IV

STATEWIDE FINDINGS/RESULTS - EDUCATION/TRAINING/CERTIFICATION DESIRED

This chapter highlights the education and training desired as compiled from the individual responces to the questionnaire as well as the education/training needs indicated by plant superintendents. Current and desired certifications are also presented.

Waterworks Certification

The most common current certifications in waterworks subgrades were in Groundwater (G) (87% of the respondents) and Distribution (D) (80% of the respondents) among personnel working in "water utility systems only." For personnel working in "both water utilities and wastewater systems," the rate of response was 87 percent and 85 percent respectively for the two subgrades.

The most commonly desired certifications were for Iron Removal (I) (15%) and Surface Water (S) (12%) for water utility personnel and 17 percent and 13 percent respectively for the two subgrades among personnel working in both systems.

Additional data appear in Appendixes B and D.

Desired Water Utility Training

Table 20 indicates the ranking of the top 26 water utility subjects/topics overall and by reason for desiring training by personnel working in water utilities only (N = 179), and by those working in "both water utility and wastewater systems" (N-188). The rankings are based on percents of N who responded to the respective reasons for desiring training in the respective subjects. Data indicate that Item #49, Preventative Maintenance ranks #1 overall based on 63% of the water utility personnel desiring it to improve operations. Item #32, Leak Detection and Repair ranks second on the basis of 62% response by those working in both water utility/wastewater. Figures under certification and personal development are included only if that topic ranked eleven or higher within that reason.

In response to Q 68 "other" water utility subjects/topics indicated by VTAE district of origin were "New Products" (WWTI) and "Thawing of Services in Detail" (NWTI).

Please refer to Appendixes B and D for tabulations of responses to reasons for desiring training for all water utility subjects/topics.

Tables 21-26 summarize statewide training needs indicated by 36 superintendents of water utilities. Please refer to Appendix J for the number of water utility superintendents responding and personnel reported by VTAE districts.

Table 20

TOP TWENTY-SIX WATER UTILITY SUBJECTS/TOPICS DESIRED FOR TRAINING (Q16-67)

Water Utility Subjects/Topics Item Number	Overall Rank	Rank By Reasons for Desiring Training By Two Groups											
		For Certification				To Improve Operations				For Personal Development			
		Water Utility Only		Both W.U. & W.W		Water Utility Only		Both W.U. & W.W.		Water Utility Only		Both W.U. & W.W	
		Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%
49 Preventative Maintenance	1					1	63	5	60				
32 Leak Detection and Repair	2					3.5	55	1	62				
25 Pumping Equipment and Controls	4.5					6	54	3	61				
26 Pumping Equipment Maintenance	4.5					6	54	3	61				
23 Distribution Systems Maintenance	4.5					9.5	52	3	61				
33 Emergency Operations	6					2	58	11	51				
30 Unaccounted for Water	7.5					3.5	55	8	54				
31 Cold Weather Operations	7.5					6	54	6	55				
22 Distribution Systems	10	4	13	5.5	11	8	53	8	54				
41 Water Meters Testing	10					14.5	45	8	54				
42 Water Meter Maintenance & Repair	10					14.5	45	8	54				
18 Safety	12.5					9.5	52	15	46				
56 Electricity	12.5					9.5	52			1	43	2	34
20 Reservoir Maintenance	14					11	50	13.5	46				
28 Chemical Addition, Type, Safety, Amounts, Troubleshooting	15.5	10.5	10	8.5	10	12	49	19.5	40				
44 Cross-Connection Control	15.5	4	13			13	46	12	49				
48 Management of Plant Operations & Record Keeping	17					17	43	13.5	47				
43 Cutting In Valves and Services	18.5							16	44				
50 Building & Ground Maintenance	18.5					16	44						
27 Bacterial Contamination/ Disinfection	20	4	13	3	14	18	42	17	43				
46 Energy Conservation	21.5					19	41	18	41				
67 Problem-Solving Skills	21.5									2	41		
16 DNR Requirements for Sampling, Reporting and Operations	24.5	2	16	2	15	20.5	40	19.5	40				
40 Chemical Contamination	24.5	7	12			20.5	40						
55 Electronics	24.5									3.5	40	2	34
63 Oral Communication	24.5									3.5	40	9.5	30

Table 21

LABORATORY TECHNICIAN TRAINING NEEDS INDICATED BY WATER UTILITY SUPERINTENDENTS (Q 4a)

(Number of responses indicated in parenthesis)

- Sampling Techniques (4)
- Chlorination (3)
- Quality Assurance/Quality Control (2)
- Flouridation (2)
- Record Keeping (2)
- Impress Need for Accuracy (2)
- Organics - Detection of Volatile Organics (2)

Several topics were indicated once: MCL Testing, Proper Use of Equipment, SDWA Requirements, Chemical Contamination, Monitoring of Tests, Water Testing Requirements, Math.

Table 22

OPERATOR PERSONNEL TRAINING NEEDS INDICATED BY WATER UTILITY SUPERINTENDENTS (Q 4b)

(Number of responses indicated in parenthesis)

- Yes (11) refers to the number of X's or checks for the category
- Preventative maintenance (5)
- Safety (3)
- Cross-connection control (2)
- DNR/PSC requirements, rules (2)
- Operation by computer, automation (2)
- Emergency situations (2)
- Basic operations (2)

Several topics received one response: New methods, telemetry, hands-on operations, chemistry of water treatment, chemical feeds, cost-saving methods, hydraulics, basic, softening knowledge, contamination hazards, problem-solving, costs of water, wells, lab procedures, and importance of safe water.

Table 23

MAINTENANCE PERSONNEL TRAINING NEEDS INDICATED BY WATER UTILITY SUPERINTENDENTS (Q 4c)

(Number of responses indicated in parenthesis)

- Preventative Maintenance, Methods, Importance of Scheduling (12)
- Yes (7) Refers to the number of X"s or checks for the category
- Safety (5)
- Pumps, Meters, Equipment (5)
- Hands on Electric/Electronics Maintenance (4)
- Troubleshooting (2)
- Computer Use, Microprocessor Control (2)
- Time Maintenance Record Keeping (2)

Several topics received one response, e.g., emergency operations, cross-connection control, in our plant, ground care, new techniques, water-borne disease, cold weather operations, chlorine systems, chemical feeds, and problem solving.

Table 24

ADMINISTRATIVE PERSONNEL TRAINING NEEDS INDICATED BY WATER UTILITY SUPERINTENDENTS (Q 4d)

(Number of responses indicated in parenthesis)

- DNR/PSC requirements, permits, forms, reporting, records, retention (5)
- Budget Preparation (3)
- Public Relations (3)
- Leadership/Management Skills (3)
- Plans, Planning, Specifications (2)
- Supervision of Personnel, Personnel Matters (2)

Topics receiving one response were: Review of Administrative Code, What to do about losses, Computers, and Record Keeping

Table 25

SUPERVISORY PERSONNEL TRAINING NEEDS INDICATED BY WATER UTILITY SUPERINTENDENTS (Q 4c)

- Labor management, dealing with unions, improving employee/employer relations, personnel management (6)
- Management/administrative skills, scheduling work, delegating jobs (5)
- Communications/information, language skills, oral communications (4)
- General operations, operational standards (2)
- Leadership skills (2)

Several topics had one response: Basic skills, customer relations, computers, groundwater problems, safety, stress.

Table 26

OTHER CRITICAL TRAINING NEEDS INDICATED BY WATER UTILITY SUPERINTENDENTS (Q 4f)

(Number of responses indicated in parenthesis)

- Orientation of Elected Officials, Familiarity with all departments (5)
- Public Relations (4)
- Time Management (4)
- Sources of Funding (3)
- Communications (3)
- Math and Science Refresher (3)
- Problem Solving (3)
- Administrative Skills (2)

Several topics had one response, e.g., budget preparation, radiation in water, informative meetings, water education programs in the schools, speakers bureau, public speaking, training of new supervisors, leadership skills and regulations for small sanitary districts and utilities.

Wastewater Certification

Although current certifications in wastewater were relatively equally distributed among the four grades and 11 subgrades, the most common were Grade 4 for Primary Settling (A) (33 percent) and Laboratory (J) (32 percent) among

Table 27

TOP TWENTY-NINE WASTEWATER SUBJECTS/TOPICS DESIRED FOR TRAINING(Q 36-118)

Wastewater Subjects/Topics Item Number	Overall Rank	Rank/Percent By Reasons for Desiring Training											
		For Certification				To Improve Operations				For Personal Development			
		Wastewater Only		Both W.W. & W.U		Wastewater Only		Both W.W. & W.U.		Wastewater Only		Both W.W. & W.U	
		Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%
47 Lift Station Maintenance/ Troubleshooting	1							1	58				
89 Cold Weather Operations	2					2	48	2	57				
95 Preventative Maintenance	3					3	44	3	56				
43 Collection System Maintenance	4							4	55				
48 Flow Measurement	5			10.5	8	4	42	5	52				
31 Wastewater Pumping Equipment	6.5							6.5	51				
42 Collection Systems	6.5							6.5	51				
46 Infiltration & Inflow Identification	9					7.5	40	8.5	50				
52 Shock Loads & Toxicity Problems	9					1	50	12	44				
94 Corrective Maintenance	9					7.5	40	8.5	50				
71 Chlorine Disinfection	12.5			4	12			10.5	45				
91 Emergency Operations	12.5					5.5	41	10.5	45				
105 Electricity	12.5									1.5	45	9.5	31
119 (109) Supervision of Personnel	12.5									1.5	45	1	37
110 Leadership Skills	15									3	44	2.5	35
49 Electrical Equipment and Instrumentation	17.5							13	43				
104 Electronics	17.5									5	43	9.5	31
112 Oral Communications	17.5									5	43	4	32
116 Problem-Solving Skills	17.5									5	43	9.5	31
99 Management/Plant Operations & Record Keeping	21.5							14.5	42				
39 Safety	21.5							14.5	42			9.5	31
111 Administrative Skills	21.5									7.5	42	7	32
113 Written Communications	21.5									7.5	42	2.5	35
90 Odor Control	24.5					5.5	41	16	41				
114 Improving Employee/Employer Relations	24.5									9	41	5.5	33
36 DNR Requirements for Sampling, Reporting, & Operation	27.5	3	17	2	19			18	40				
72 Ultraviolet Light Disinfection	27.5											10	40
84 Dissolved Oxygen Control and Determination	27.5			7	10			18	40				
96 Energy Conservation	27.5							18	40				

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personnel working in "wastewater systems only." For personnel working in "both wastewater and water utility systems" the most common were Grade 2, Disinfection (E) (31 percent) and Grade 1, Stabilization Ponds/Aerated Lagoon (D) (30 percent response rate).

The most commonly desired certifications in wastewater were Grade 4, Activated Sludge (C) (23 percent), Disinfection (E) (23 percent), and Laboratory (J) (23 percent) among personnel working in wastewater systems only. The most common certifications desired by personnel working in both systems were Grade 4 in the same subgrades at 12 percent, 13 percent, and 12 percent respectively. Additional data appear in Appendixes C and D.

Desired Wastewater Training

Table 27 indicates the ranking of the top 29 wastewater subjects/topics overall and by reason for desiring training by personnel working in Wastewater systems only (N = 301) and by those working in both wastewater and water utilities (N = 188). The rankings are based on percents of N who responded to the respective reasons for desiring training in the respective subjects. Data indicate that Item #47, Lift Station Maintenance/Troubleshooting ranks #1 overall based on 58% of the both group desiring this training to improve operations. Item #89, Cold Weather Operations ranks second on the basis of 57% response also by those working in both wastewater and water utilities. Figures under certification and personal development are included only if the topic ranked 12 or higher within that reason.

In response to Q 117-118 several topics were added by responders as indicated in Table 28.

Table 28

"OTHER" WASTEWATER SUBJECTS/TOPICS BY WASTEWATER PERSONNEL (Q 117-118)
(Origin indicated by VTAE area in parenthesis)

- Understanding Your Plant Construction (one)
- Stabilization of Pond Control (one)
- Landscaping (MATC-Mdsn)
- New Plant Starter (MATC-Mdsn)
- How to Work with Contractors (MATC-Mdsn)
- Standby Power (MATC-Mdsn)
- Job Fatigue of Plant Operators (Burn Out) (MPTI)
- Federal EPA Changes/Updates in Laws & Codes P.L. 92-500 (MPTI)
- Wisconsin Administrative Code (MPTI)
- Lab Instrumentation Maintenance (NWTI)
- Testing (WITI)
- Plumbing Inspection Codes, etc. (WITI)

Another topic, "Gas Detector Meters" was indicated by a person from the MPTI district who worked in both water utility/wastewater systems.

Please refer to Appendixes C and D for tabulations of responses to reasons for desiring training for all wastewater subjects/topics. Tables 29-34 summarize statewide training needs indicated by 85 superintendents of wastewater plants. Please refer to Appendix K for the number of superintendents responding and personnel reported by VTAE district.

Table 29

LABORATORY TECHNICIAN TRAINING NEEDS INDICATED BY WASTEWATER PLANT SUPERINTENDENTS (Q 4a)
(Number of responses indicated in parenthesis)

- Quality Assurance (23)
- Courses in Changing Procedures, Standards (6)
- Sampling Techniques, Testing Procedures (5)
- Yes (5)
- Basic Lab (4)
- Instrumentation (4)
- Troubleshooting Procedures (3)
- Toxic Organic Analysis Methods, Problems (3)
- Lab Testing for Nutrients (3)
- Basic Chemistry (2)
- Micro-techniques (2)
- Industrial Monitoring (2)

Table 30

OPERATOR PERSONNEL TRAINING NEEDS INDICATED BY WASTEWATER PLANT SUPERINTENDENTS (Q 4b)
(Number of responses indicated in parenthesis)

- Safety (6)
- Basic Operations (5)
- Yes (5) (Refer to the number of X's or checks for this category)
- Sludge Conditioning, Application (5)
- Process control (4)
- Cold Weather Operations (3)
- Computer Use (3)
- Anaerobic Digestion (3)

Several topics had two responses: Emergency Operations, Troubleshooting, New Regulations, Attitudes, Laboratory Skills, Hydraulics, Physics, Problem-solving - Decision-making, Instrumentation, Understanding of Technical Data, Pond and Lagoon Operation, Biology, Refresher Course, and Advanced Training. Refer to further listings under VTAE District findings.

Table 31

MAINTENANCE PERSONNEL TRAINING NEEDS INDICATED BY WASTEWATER PLANT SUPERINTENDENTS (Q 4c)
(Number of responses in parenthesis)

- Preventative Maintenance, Practices, Planning (19)
- Safety (8)
- Attitudes, Appreciation of Importance, Cleanliness (6)
- Record Keeping (5)
- Electric Controls, Basic Electricity, Electronics (4)
- Troubleshooting, problem-solving (4)

Several topics had two responses: Computer use, Maintenance of Plant Instrumentation, Courses on technical equipment, keeping abreast of new products, New Requirements, Techniques, Instrumentation, Mechanical Seal Application and Maintenance, and Basic Wastewater Knowledge, Understanding of Operations. Refer to further listings under VTAE District findings.

Table 32

ADMINISTRATIVE PERSONNEL TRAINING NEEDS INDICATED BY WASTEWATER PLANT SUPERINTENDENTS (Q 4d)

(Number of responses indicated in parenthesis)

- Budget Preparation, Planning, Cost Controls (13)
- DNR/PSC/EPA Requirements, Laws, Permit Forms (7)
- Management of Plant Operations, Time Management (6)
- Computer Use (5)
- Record Keeping (5)
- Administrative Skills (4)
- Public relations (3)
- Personnel Problems, Understanding Employers (3)
- Source of funding (2)
- Inventory Control, Setting It Up (2)

Refer to further listings under VTAE District findings.

Table 33

SUPERVISORY PERSONNEL TRAINING NEEDS INDICATED BY WASTEWATER PLANT SUPERINTENDENTS (Q 4e)

(Number of responses indicated in parenthesis)

- Employee Relations, Motivation, Working with Unions (15)
- Leadership Skills/Supervisory Skills, Delegation (8)
- Management, Organization, Time Management (7)
- New Regulations, Laws, Procedures, Equipment (4)
- Computer Use (4)
- Budgeting (3)
- Communications (3)
- Record Keeping (3)
- Public Relations (2)

Refer to further listings under VTAE District findings.

Table 34

OTHER TRAINING NEEDS INDICATED BY WASTEWATER PLANT SUPERINTENDENTS (Q 4f)

(Number of responses indicated in parenthesis)

- Orientation of Elected Officials (10)
- Public Relations, Customer Relations (8)
- Sources of Funding (6)
- Problem-Solving (5)
- Interpersonal Relations (5)
- Budget Preparation (4)
- Communications (4)
- Time Management (3)
- Leadership Skills, Supervisory Skills (3)
- Administrative Skills (3)

Several topics received two responses: DNR regulations, Interpretation, Priorities, Computer Use and Programming, Collector System Maintenance, Biology/Microbiology, Operational Skills, General Knowledge of Operations, Efficiency, Economics, Industrial wastewater operations, and Parliamentary procedures. Refer to further topics under VTAE District findings.

Tables 35-40 summarize statewide training needs indicated by 85 superintendents of both water utility/wastewater plants (Q 4, Form D).

Table 35

TRAINING NEEDS OF LABORATORY TECHNICIANS INDICATED BY SUPERINTENDENTS OF BOTH WATER/WASTEWATER PLANTS (Q 4a) N = 83

(Number of responses indicated in parenthesis)

- Testing Basic Lab Procedures Update (10)
- Yes (9) (Refers to X"s and checks indicated for the category)
- Quality Assurance (7)
- New Technology, New Procedures (4)
- Math, Calculations (2)
- New Equipment (2)
- DNR/EPA Regulations, Certification Changes (2)
- Fecal Coliform (2)
- Keep Certified, Basic Skills (2)

Topics with one response were: Safety, instrument calculation, Nitrates, and Improve Operations.

Table 36

TRAINING NEEDS OF OPERATOR PERSONNEL INDICATED BY SUPERINTENDENTS OF BOTH WATER UTILITY/WASTEWATER PLANTS (Q 4b) (N = 83)

- Yes (17) (Refers to X's and checks indicated for the category)
- Basic Operations/Certification Training, Updating (15)
- Safety (3)
- Process Control for Activated Sludge (3)
- Field Construction (2)
- Confined Area Entry (2)
- Preventative Maintenance (2)

Several topics received one response: Public relations, math, industrial monitoring, hands on training, pump maintenance, troubleshooting, critical procedures, operative measures for fluctuations by seasons and environment, aerated lagoons, new plant operations, and use of current technology on remote monitoring.

Table 37

TRAINING NEEDS OF MAINTENANCE PERSONNEL INDICATED BY SUPERINTENDENTS OF BOTH WATER/WASTEWATER PLANTS (Q 4c)

(Number of responses indicated in parenthesis)

- Yes (15 (Refers to X's and checks indicated for the category)
- Preventative Maintenance, Certification Training, Forms (12)
- Electricity/Electronics, Control Wiring, Troubleshooting (3)
- Pumps and Motor Maintenance (3)
- Safety (2)
- Plant Economics (2)
- Cold Weather Operations (2)
- New Plant Operations (2)

Several topics were reported only once: Troubleshooting, time management, automated equipment repair, hands-on training, confined area entry.

Table 38

TRAINING NEEDS OF ADMINISTRATIVE PERSONNEL INDICATED BY SUPERINTENDENTS OF BOTH WATER/WASTEWATER PLANTS (Q 4d)

(Number of responses indicated in parenthesis)

- Budget Preparation (4)
- Communications (2)
- Understanding of Plant Operations (2)
- Requirements, Changes in Regulations (2)

Several topics were reported only once: Administrative skills, sources of funding, setting up an inventory plan, operating with limited funds, coping with stress, changes in pre-treatment, computer skills, public relations, and train public officials on the responsibilities that operators have in small communities.

Table 39

TRAINING NEEDS OF SUPERVISORY PERSONNEL INDICATED BY SUPERINTENDENTS OF BOTH WATER/WASTEWATER PLANTS (Q 4e)

(Number of responses indicated in parenthesis)

- Leadership Skills, Supervision of Personnel (5)
- Understanding of Plant Operations (4)
- Public Relations (3)
- Employee Relations (3)
- Communications (2)

Several topics were reported once: Sources of funding, time management, laws regarding wastewater, cold weather operations, trenching, pumping maintenance, water distribution, coping with stress, computer skills, and yes (refers to X's and checks indicated for the category).

Table 40

OTHER TRAINING NEEDS INDICATED BY SUPERINTENDENTS OF BOTH WATER/WASTEWATER PLANTS (Q 4f)

(Number of responses indicated in parenthesis)

- Orientation of Elected Officials (8)
- Sources of Funding (4)
- Problem-Solving (3)
- Time Management (3)
- Communications (2)
- Public Relations (2)
- Budgeting (2)

Several topics were reported once: Utility management, administrative skills, safety, attitude of workers toward job, computr use, quality control and assurance, math, and coordination of regulatory agencies.

Suggestions for Training Elected Officials

The following tables indicate suggestions for orientation/training of elected officials.

Table 41

SUGGESTIONS FOR ORIENTATION/TRAINING OF ELECTED OFFICIALS BY WATER UTILITY PERSONNEL (Q 75)

(Number of responses indicated in parenthesis)

- Tour/Visit Facilities, Become Familiar with Problems, Talk with Workers, (once per year) (9)
- They should attend classes, workshops, seminars, ETN, to gain understanding of operations, problems, rules, regulations; and the need for trained/certified personnel (perhaps 8 hours), (perhaps evenings) (6)
- Regulatory agencies should develop and present sessions (3)
- Use personnel with "hands on" experience (2)
- Make presentations at council meetings (2)
- Require them to take exams/become certified (1)
- DNR or PSC reports to local newspapers (1)
- State AWWA should have information program (1)

Table 42

SUGGESTIONS FOR ORIENTATION OR TRAINING OF ELECTED OFFICIALS BY WASTEWATER PERSONNELL (Q 125)

- They should attend classes, workshops, seminars on plant operations, costs, safety, penalties, importance (during evenings) (23)
- Tours/visits of plant, open house, meet with workers, (perhaps a tour or meetings throughout state or plant operations (20)
- Develop a package (audio visual) including plant design characteristics, types of treatment, responsibilities, operations, rules, regulations, block diagrams, form a committee to decide course of action (5)
- Operators and officials attend classes together (3)
- Make presentation at council meeting (during evenings) by DNR, WPCF, regarding operations, certification rules, present annual report, regulations, pollution and environmental concerns (3)
- Make training/orientation mandatory by law (3)
- Communications, pass suggestions on to consulting engineers, interchange between WWWOC, AAWA, Wisconsin League of Municipalities, Wisconsin Society of Professional Engineers (2)
- Use people who have had hands-on experience (2)
- Require one of them certified (2)

  News media, get local people excited about the plant, take pictures while officials are touring plant (2)
- Direct mailings, WWWOC Clarifier, DNR Certified Operator (2)
- Reach them through the League of Municipalities

Table 43

SUGGESTIONS FOR ORIENTATION OR TRAINING OF ELECTED OFFICIALS BY PERSONNEL WORKING IN BOTH WATER UTILITY/WASTEWATER SYSTEMS (Q 75)

(Number of responses in parenthesis)

- Sessions (Importance of jobs, responsibilities, need for training rules, regulations) (12)
- Evenings or Saturday Sessions (one or two per year, after spring election) (5)
- Good communications, talk with workers (3)
- Manadatory sessions, courses, written exam prior to appointment (3)
- Make presentation at their regular meetings (2)

Suggestions mentioned once: Presentation to Wisconsin League of Municipalities, Budgeting, source of funding, Get them involved, Officials should be made to feel they are partners to regulatory agecies, not opponents to them.

Table 44

SUGGESTIONS FOR ORIENTATION OR TRAINING OF ELECTED OFFICIALS BY PERSONNEL WORKING IN BOTH SYSTEMS (Q 125)

(Number of responses in parenthesis)

- Sessions (basic operations, different types of waste treatment plants, awareness of problems, jos, responsibilities, rules, regulations, by outsider (9)
- Make orientation, training mandatory, similar to our operator's certification program (6)
- Newsletter mailings, changes in requirements (5)
- Evening/Saturday sessions, 1 or 2 per year (4)
- Tour of facilities (2)
- Mandatory public relations meetings (2)
- Ask them to attend training sessions with you
- Practical experience
- Some ETN sessions

Miscellaneous Comments

The following tables indicate miscellaneous comments to various "other" items or questions, e.g., 11.9 = Best ways to find out about training; 71.7 = Preferred length of sessions; 73.9 = Preferred agency for providing training, and 74.10 = Preferred methods of delivery.

Table 45

MISCELLANEOUS COMMENTS BY WATER UTILITY PERSONNEL
(Q 11.9, 71.7, 73.9, 74.10)
(Frequency and origin of comment indicated by VTAE area in parenthesis)

Q 11.9	Salesmen (3) (BTI-2) (Milw); mailing lists, direct to me (2) (Mdsn) (GTI); AWWA Journal (Milw); DNR Bulletins (2) (Milw) (MPTI); don't send anything to city hall - it gets lost (WWTI); N.E. Wis. Section (FVTI); NCTI flyer (NCTI)
Q 71.7	Three hours (2) (WCTI) (Milw)
Q 73.9	(ETN) (GTI); By experienced plant operators (MSTI)
Q 74.10	Hands-on (Mdsn); bring classroom lectures outside and make them pertinent to job circumstances (NWTI); tapes, cassettes (NCTI)

Additional miscellaneous comments in Table 46 refer to 120.7 = Preferred time of day; 121.7 = Preferred length of sessions; 123.9 = Preferred agency; and 124.10 = Preferred methods of delivery.

Table 46

MISCELLANEOUS COMMENTS BY WASTEWATER PERSONNEL
(Q 11.9, 12.7, 121.7, 123.9, 124.10)
(Origin of comments indicated by VTAE area in parenthesis)

Q 11.9	Mailings from MATC-Mdsn (2); correspondence (MATC-Mdsn); on certification exam days (GTI); personal mailings (NCTI); other mailed literature (WCTI); mailings (MPTI); newspaper (NWTI); Northwest Ripplings (WITI)
Q 120.7	Must fit into my schedule (MPTI)
Q 121.7	One day away from home/any length otherwise (MPTI); enough time to cover material (MATC-Mdsn); 1/2 days, 2 days a week for 2 weeks (NWTI)
Q 123.9	State of Lab of Hygiene (GTI); anyone who puts on a top quality course (WCTI) TAPPI (NWTI) (NCTI); NCASI (NCTI)
Q 124.10	Combination of most useful methods (MATC-Mdsn) cassette tapes and correspodence (MPTI)

Table 47

MISCELLANEOUS COMMENTS BY PERSONNEL IN BOTH SYSTEMS
(Q 11.9, 70.1, 71.7,73.9, 123.9, 124.10)
(Frequency of origin of comments indicated by VTAE area in parenthesis)

Q 11.9	ETN sessions (one - Eau Claire); mailings sent to me SWTI, (LTI); mailings from university (BTI); notices (WCTI); UWEX announcements (Milw); former classmates (MPTI)

Q 70.7 9:00 - 2:30 - some of these classes are too long when some of us have to drive 70 miles one way (MSTI)

Q 71.7 Depends on course (Nicolet); three hours with ETN (WITI)

Q 73.9 ETN (WWTI); people who work in the field (Milw); hands-on training (FVTI)

Q 123.9 Maybe a person-to-person session

Q 124.10 Visual or hands-on is far better than just ear contact (not identified)

Other Suggestions or Comments

The response to Q 76, Form B and Q 126, Form C, are indicated in the following tables.

Table 48

OTHER SUGGESTIONS OR COMMENTS BY WATER UTILITY PERSONNEL (Q 76)

- Everyone cannot attend all sessions because of shift work, need for 24 hour availability, travel distances, and other commitments (end sessions at 3:00 p.m. for travel) (2)
- Better communication between management and workers to build trust (2)
- Maintenance of waterworks equipment, especially pumps (2)
- Use video tapes, films, slides, etc.
- Give recognition and compliments to those who do good job
- Design the program so all parties can benefit by it
- The instructors should be thoroughly versed and experienced in their subject
- Consumer relations
- Math for operating water utility
- DNR is good organization for small community to have training
- More courses closer to home
- Conduct classes at different utilities on a rotating basis to learn something from host utility
- ETN's (use video) should be at least 3, 4 or 6 hours at a sitting to cover material properly
- Get rid of ETN, too boring, I learn very little

Please refer to other suggestions listed in the findings for each VTAE district

Table 49

OTHER SUGGESTIONS OR COMMENTS BY WASTEWATER PERSONNEL (Q 126)

- Offer advanced training (6)
- Better prepared instructors, upgrade quality of instructors, keep subject matter to the points needed to improve, training should be given by an experienced operator, training is becoming redundant (6)
- Encourage management personnel to encourage employees to seek continuing education. Should be given on "company time." It is impossible for me to get away. (5)

- Continuing education should be set up for industrial treatment situations and handling (5)
- DNR personnel are a valuable training tool, they have done a more complete job (4). Divide classes into groups according to size of wastewater system.
- Stop changing forms so often - some don't work on computer. Evening courses would enable attendance (4).
- Develop workbooks and audio-visual that relate directly to material given on certification exams. Teach to the exams. (4)
- Would like to see classroom ready to start classes on time (3). Stricter attendance to the end of sessions, dinner meetings should not count. Social activities and training should be kept separate.
- Re-write DNR exams, keep tests steady and not far out for operations, remove some math. (4)
- Eliminate "grandfather" clause on certification rules (3) Superintendents who will grandfather in should be updated in training (3)
- It is necessary to get cooperation and input from all agencies listed in #123. Avoid overlapping of bureaucratic agencies' buck passing (2)
- Give DNR certification exams after each course instead of scheduled so many times a year (2)
- Training should be as close to place of work as possible. Some should be at a plant, I find it hard to travel to some seminars. (2)
- Administrative and management techniques (2)

Several individual comments received one response: See further suggestions under VTAE District findings.

Table 50

"OTHER" SUGGESTIONS OR COMMENTS BY PERSONNEL WORKING IN BOTH WATER UTILITY/WASTEWATER SYSTEMS (Q 76)

- This survey is a good thing, should be done again periodically (3)
- Have classes closer to home (2)
- Many part-time operators do not have the time to take 3 days each week for 2 weeks
- ETN's work out well for me
- The 2 to 4 hour ETN sessions need much improvement
- Have person from Insurance Service office give operators demonstrations
- Maintenance and troubleshooting
- Public relations
- Set up courses only for water distribution system, I'm not interested in water softening, lime removal, etc.
- Budgeting for elected officials
- Demonstrations plus films on equipment, etc.
- More control on credit hours awarded for convention attendance
- Certification classes should be more specific in content
- Flyers on classes could be sent more regularly
- Updates on Federal, State and Local regulations, ongoing
- Microbiology
- Lab equipment
- Keep up the good work

"OTHER" SUGGESTIONS OR COMMENTS BY PERSONNEL IN BOTH SYSTEMS (Q 126)

- Improve instruction and instructors (3)
- Have sessions closer to home (3)
- All items in questionnaire should be touched upon during continuing education
- Smaller groups
- ETN's work out well for me
- Have sessions that pertain to our plant or lagoons
- Troubleshooting
- Troubleshooting an activated sludge plant for below-water level problems
- Top management of private operations should be made aware of requirements and penalties
- Maintenance record keeping
- Recognition of employees for a job well done
- Part-time operators don't have time for lengthy sessions
- Have sessions for small plants
- Have courses only for sanitary sewer collection, I have no reponsibility for wastewater treatment plant
- A summer intern program for students in good on-site newer wastewater plants funded by DNR
- Closer control of class hours credited for conventions
- Mailings to the individual are important, I have received only one "Clarifier" in three years
- Continuous orientation of new and existing supervisors on regulations
- More advanced courses
- All operators should attend their council, town or commission meeting

Chapter Summary

Water utility personnel appear to desire training the most in the areas of preventative maintenance and emergency operations. Superintendents of water utilities also indicated preventative maintenance as a priority item for operator and maintenance personnel. Sampling techniques for laboratory technicians, DNR/PSC requirements for administrative personnel, and employee relations for supervisory personnel received the highest ratings. Another critical training need was orientation of elected officials.

Wastewater personnel also indicated maintenance/troubleshooting and cold weather operations as top priorities for training. Superintendents of wastewater plants indicated quality assurance for laboratory technicians, safety for operator personnel, preventative maintenance for maintenance personnel, budget preparation for administrative personnel, employee relations for supervisory personnel, and orientation of elected officials as the top training needs.

Superintendents of "both" systems indicated laboratory procedures and testing, basic operations, preventative maintenance, budget preparations, leadership skills, and orientation of elected officials as top training priorities.

Suggestions for orientation/training of elected officials appeared to be tours of facilities, mandatory attendance at classes, seminars, workshops on the overall operations and/or making presentations at their meetings. Several other general suggestions and comments are presented for analysis.

VTAE DISTRICT FINDINGS/RESULTS

IV

FINDINGS/RESULTS FOR VTAE DISTRICT ONE - EAU CLAIRE AREA

Table 51 indicates that over 40% of the respondents were employed in either the wastewater system only or in both water utility and wastewater systems.

Table 51

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System Only	3	7
Wastewater System Only	20	43
Both Water Utility & Wastewater Systems	21	46
Not Working in Either Water Utility or Wastewater	2	4
TOTAL	46	100

General Findings in Water Utility Systems

In response to Form A, Q 3.5 the "other" job titles or job classifications reported were: Foreman and Shop Foreman.

The areas of the most recent formalized education or training received relevant to their job (Q 8) were: water works operator course (3) and water products. One person received this in a seminar by Rockwell International at Baldwin in October 1983.

Waterworks Certification

The most commonly desired certification was in Surface Water (S) (13 percent response). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Fifty-two percent (52%) or more of the 23 respondents to Form B (*) desired training in the following subjects/topics: (In rank order)

- Distribution Systems
- Preventative Maintenance
- Distribution System Maintenance
- Leak Detection and Repair
- Cross-connection Control
- Pumping Equipment and Controls
- Pumping Equipment Maintenance
- Bacterial Contamination/Disinfection
- Unaccounted - For Water
- Cold Weather Operations

Table 20 and Appendixes B and F should be analyzed for overall statewide and

VTAE District One rankings and percents of responses for desired training in additional water utility subjects/topics.

(*) Responses of personnel working in water utility systems only and for those working both/combined water utility/wastewater systems are separate at the state level but combined at the VTAE district level because of potential small cells if they were separated.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were indicated as Technical Director and Operator Foreman.

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Wastewater Operator Grade Training (5)
- Physics
- Chemistry (2)
- Activated Sludge and Laboratory
- Groundwater flouridation class
- Vocational school classes
- Laboratory (4)
- Activated sludge
- Operation of wastewater treatment plants
- Wastewater treatment course - District One, Eau Claire
- Two microbiology courses, human relations, VITA Eau Claire
- General wastewater, ponds, advanced ponds
- WWWOC certification course
- Medical assistant program
- Communication skills
- Continuing education course

"Other" sources indicated for the above training (Q 9.4) were UW-Eau Claire, Missouri, UW-Madison, and a correspondence course from Sacramento State University, California.

Suggestions for orientation/education of elected officials (Q 125) were as follows:

- Tour of the plant (2)
- Plant design characteristics, types of treatment, block diagrams could be made into a package by plant operators and given to newly elected officials.
- Pass suggestions on to consulting engineers
- Communication

"Other" suggestions (Q 126) were as follows:

- Voc-tech courses at Eau Claire and WWWOC seminars have been extremely helpful. DNR personnel are a valuable training tool also.
- Sludge disposal and anaerobic digestors

- I am a shift operator and no provision was made to allow me to attend when on a shift when meeting was held.
- Possibly divide classes into groups according to size of wastewater system
- Would like to see classroom ready and to start classes on time.

Wastewater Certification

The most common desired certification with 10 percent responses were in Subgrades, General Introduction, Activated Sludge (C), Stabilization Ponds/Aerated Lagoon (D), Disinfection (E) and Laboratory (J) for Grade 2 level. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Fifty percent (50%) or more of the 40 respondents to Form C (*) desired training in the following subjects/topics.

Cold Weather Operations
Shock Loads and Toxicity Problems
Blower and Aeration Equipment Operation
Sludge Hauling and Land Application
Wastewater Pumping Equipment
Flow Measurement
Preventative Maintenance

(*) Responses of personnel working in wastewater works systems only and for those working in both/combined water utility/wastewater systems are separate at the state level but combined at the VTAE district level because of resulting small cells at the district level if they were separated.

Training needs for various categories of personnel indicated by four superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Basic lab, quality assurance (2) sampling techniques, training is needed

2. Operator Personnel: Introduction to wastewater, hydraulics, electricity, physics, attitude, job performance, training is needed

3. Maintenance Personnel: Electrical controls, general preventative maintenance, attitude, job performance, training is needed

4. Administrative Personnel: DNR requirements, permits, forms, budget preparation

5. Supervisory Personnel: Budgeting, leadership skills, personal relations

6. Other Training Needs: Computer use and programming, stress management

Table 27 and Appendixes C and G should be reviewed for overall statewide and VTAE district rankings and response rates for desiring education and training in wastewater subjects/topics.

General Findings from Personnel Working in Both Systems

"Other" job titles/classifications (Q 3.5) reported were as follows: Maintenance Superintendent, Superintendent/Manager, Part-Time Operator, and Administrator of Public Utility Services.

Subject areas of education/training recently received relevant to the job (Q 8) were indicated as follows:

- Ground water treatment (2)
- Ponds, VTAE (3)
- Wastewater - WWWOC conference La Crosse
- Wastewater plant operations (2)
- Water department operations (2)
- Utilities management
- Wastewater through Voc-tech school (2)
- Water school through Voc-tech school and ETN sessions
- Associate of Science in water quality technology
- Aerated lagoons
- Lab procedure

Suggestions for orientation/training of elected officials (Q 75) were as follows:

- Have them get more involved, send in reports
- Orientation of rules and regulations
- Workshops
- Attend some of our training sessions

For Q 125 the suggestions were:

- Basic knowledge of operation, one (1) day class of different types of waste treatment plants (VIDEO)
- Workshops
- They should be made aware of our problems

An "other" suggestion (Q 76) was: This survey is a very good idea. For Q 126 it was suggested that smaller groups be instructed.

Continuing Education/Training Desired by Personnel Working in Both Systems

Responses to specific subjects/topics are included in the water utility and wastewater works section.

Training needs for various categories of personnel indicated by twelve superintendents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: calculations, instrument calibration, math, improve operations, quality assurance (2), maintain skills (2), new technology, and new equipment.

2. Operator Personnel: public relations, certified and capable operator (2), Yes (3), math, certification, operations so as to meet DNR limits on discharge.

3. Maintenance Personnel: time for proper maintenance, preventative maintenance, time management, certified operator should be capable of most maintenance problems, electronics control wiring, yes (2), ability to keep equipment operational as economically possible, troubleshooting.

4. Administrative Personnel: communication, administrative skills.

5. Supervisory Personnel: public relations, communication, time management, yes.

6. Other Training Needs: orientation of elected officials, and time management.

Refer to Tables 20 and 27 and Appendixes D, F and H for rankings and rates of responses to desired subjects/topics by personnel working in both water utility/wastewater systems.

V

FINDINGS/RESULTS FOR VTAE DISTRICT WWTI - LA CROSSE AREA

Table 52 indicates that about 40% of the respondents were employed in either the wastewater system only or in both water utility and wastewater systems.

Table 52

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)

Employment/Work Status	N	%
Water Utility System Only	6	16
Wastewater System Only	14	38
Both Water Utility & Wastewater Systems	16	43
Not Working in Either Water Utility or Wastewater	1	3
TOTAL	37	100

General Findings in Water Utility Systems

In response to Form A, Q 3.5, the "other" job title or job classification reported was: Technician (automatic controls).

The areas of most recent formalized education/training received relevant to the job (Q 8) were: electrical/electronic toubleshooting, water school at Viroqua, water works lab, and Grade 1 G. O.

One person indicated he/she obtained the training (Q 9.4) in the military.

In response to Q 11.9, one person suggested not to send anything to city hall as it may not get to him/her.

In response to Q 75 one person expressed doubt that elected officials would pay mucn attention to his/her suggestions.

In response to Q 76, one person indicated that: Everyone cannot attend all of the training sessions because of shift work and other commitments. Video tapes, films, slides, etc., could be used as time permits.

Waterworks Certification

The most commonly desired certifications were Iron Removal (I) (14 percent response) and Surface Water (S) (10 percent). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Forty-eight percent (48%) or more of the 21 respondents to Form B desired training in the following subjects/topics: (In rank order)

- Distribution Systems
- Chemical addition, type, safety amounts
- Troubleshooting
- Unaccounted - For Water
- Leak Detection and Repair
- Pumping Equipment and controls
- Cold Weather Operations
- Emergency operations

Refer to Table 20 and Appendixes B and F for further statewide and VTAE district rankings and response rates for desiring education/training in water utility subjects/topics.

General Findings in Wastewater Systems

One "other" job title/classification (Q 3.5) was Project Engineer.

Subject areas of education/training recently received relevant to job (Q 8) were indicated as follows:

- MEUW - Supervisors conference
- DNR conference, WWOC
- CPR, First Aid (Private Utility)
- Business administration
- Training courses for plant operator - 6 wks.
- The Wisconsin Council of Safety, (confined space entry program)
- Boiler water treatment
- DNR course at Voc-tech school
- Operator preparation for certification exams
- Maintenance
- Courses at WWTI
- AWWA ETN training January 17, 1984

"Other" sources of above training (Q 9.4) were University, Holiday Inn, Eau Claire, and East Troy High School.

"Other" suggestions (Q126) were as follows:

- Continuing education has not been set up for industrial treatment which is what we treat (Arcadia)
- Unqualified people use laws to guarantee employment, you use re-certification laws. To all DNR to write rules and also handle training is criminal. The questions are wrong (Form D) you designed the questions to get the answers you need.

Wastewater Certification

The most commonly desired certification was Laboratory (J) at Grade 2 (7 percent). Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Forty-six (46%) or more of the 28 respondents to Form C desired training in the following subjects/topics:

- Lift Station Maintenance/Troubleshooting
- Flow Measurement
- Cold Weather Operations
- Odor Control
- Emergency Operations
- Preventative Maintenance

Training needs for various categories of personnel indicated by two superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Keep a clean lab

2. Operator Personnel: Problem-solving (all)

3. Maintenance Personnel: All maintenance of equipment

4. Administrative Personnel: Sources of funding

5. Supervisory Personnel: Problem-solving

6. Other Training Needs: Problem-solving, funding

Refer to Table 27 and Appendixes C and H for further statewide and VTAE district rates and rankings for desiring training in wastewater subjects/topics.

General Findings from Personnel Working in Both Water Systems

"Other" job titles/classifications (Q 3.5) indicated were as follows:

- Test - PH - Iron - Chlorine Res & Flouride
- Village Supt. of garbage, sewer, water, snow removal, maintenance
- Director of Public Works
- Manager - water/wastewater utilities
- Working Foreman

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Well and Pump maintenance
- Activated sludge
- Water works 6 days
- Sewerage 6 days
- Sewer and pump maintenance at Mauston
- Distribution system maintenance at Madison UWEX
- Health administration
- Water works operator's certification course (2)
- Wastewater operator's certification course (2)
- Grade 2 operator's license
- Wastewater school (1)
- WWTI La Crosse, District One, Eau Claire
- Several short courses
- Lab work

"Other" sources of the above training (Q 9.4) were indicated as college and the County Courthouse at Mauston.

Suggestions for orientation/training of elected officials (Q 75) were:

- Mayors should be informed that operators and superintendents need this training so they don't think that anyone is able to do the job. We are professional in our work as well as businessmen, teachers, lawyers, etc.
- Awareness, return of annual questionnaire by each to qualify for grant money.
- Asked to our ETN courses.

"Other" suggestions (Q 76) were:

- We should get respect for our jobs well done
- ETN's at Mauston work out well for me
- Officials should be made to feel they are partners to regulatory agencies

For Q 126, one person said the ETN's at Mauston worked out well for me.

Continuing Education/Training Desired by Personnel Working in Both Water Systems

Responses to specific subjects/topics are included in the water utility and wastewater works section.

Training needs for various categories of personnel indicated by eight superintendents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: I do all this myself, Yes, Bod's - sampling, Nitrates, Safety and better way to run tests.

2. Operate Personnel: This is for more than one full-time employee on the staff, Safety, Field construction (2), Yes (2), More basic teaching.

3. Maintenance Personnel: Pumps and motor maintenance, Yes, Cold weather operations, Equipment maintenance, Better equipment to work with.

4. Administrative Personnel: Better understanding of plants.

5. Supervisory Personnel: Better understanding of plants.

6. Other Training Needs: A general introduction to all these (items listed in 4F) would be helpful.

Refer to Tables 20 and 27 and Appendixes D, F, and H for further statewide and VTAE district response rates and rankings for desiring training in water utility and wastewater subjects/topics.

VI

FINDINGS/RESULTS FOR VTAE DISTRICT SWTI - FENNIMORE AREA

Table 53 indicates that about 60% of the respondents were employed in both water utility and wastewater systems.

Table 53
NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)

Employment/Work Status	N	%
Water Utility System Only	10	25
Wastewater System Only	3	8
Both Water Utility & Wastewater Systems	24	60
Not Working in Either Water Utility or Wastewater	3	8
TOTAL	40	101

General Findings in Water Utility Systems

The areas of most recent education/training relevant to the job (Q 8) were as follows:

- Ground water and Distribution Training Course (2)
- Pump operation and maintenance
- AWWA Conferences, ETN, SEEN
- ETN liability
- ETN Conference
- Water Works operator (2)
- Flouridation and equipment
- Water well and pumps
- Water lab
- Certified water operator

One person reported they received the training (Q 9.4) by ETN at Monroe.

Suggestions for orientation of public officials (Q 75) were:

- I believe elected officials should be taught some of the problems in a water system and could be asked to attend some type of training session on this.

- They should attend classes like ETN or conferences with operators. Some don't understand how important and costly it is to run a water works properly. In small towns they seem to care only about money to get by, not for safety or future.

Waterworks Certification

The most common certification desired was Iron Removal (I) (26 percent response). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Sixty-one percent (61%) or more of the 31 respondents to Form B desired training in the following subjects/topics:

- Pumping Equipment Maintenance
- Distribution System Maintenance
- Leak Detection and Repair
- Reservoir Maintenance
- Distribution Systems
- Pumping, Equipment and Controls
- Unaccounted - For Water
- Emergency Operations
- Preventative Maintenance

Training needs of operator personnel indicated by one (1) water utility superintendent were as follows:

Safety
Cross-connection control
Preventative Maintenance

For maintenance personnel, emergency operations, safety and cross-connection control were indicated.

General Findings in Wastewater Works Systems

In response to Q 3.5, one person indicated he did all of the above.

Subject areas of education/training recently received relevant to the job (Q 8) were as follows: chemistry, biology, activated sludge and quality assurance in the lab.

Suggestions for the orientation/training of elected officials (Q 125) were as follows:

- Basic knowledge of the wastewater treatment system. Vocational education classes.

- Have classes designed to educate elected officials and invite them and operators to attend together.

Wastewater Certification

The most commonly desired certification was Grade 4, Primary Settling (A) (23 percent response). Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Fifty-eight percent (58%) or more of the 26 respondents to Form C desired training in the following subjects/topics:

Flow Management
Collection System Maintenance
Collection Systems
Lift Station Maintenance/Troubleshooting
Sludge Pumping Procedures
Blower and Aeration Equipment Operation
Chlorine Disinfection
Cold Weather Operations

Training needs for various categories of personnel indicated by two superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Quality assurance.
2. Operator Personnel: Safety, conduct it here.
3. Maintenance Personnel: Safety, conduct it here.
4. Administrative Personnel: Safety
5. Supervisory Personnel: Safety
6. Other Training Needs: In-plant orientation for officials, all elected officials should be exposed to "show-and-tell" sessions.

Refer to Table 27 and Appendixes C and H for additional statewide and VTAE district rankings and response rates to subject/topics for desired training.

General Findings from Personnel Working in Both Systems

"Other" job titles/classifications (Q 3.5) were:

- All of the above
- City Engineer
- Municipal aide
- Department head

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Management/Supervision
- Ammonia Class
- Operator Maintenance (2)
- Civil Engineering
- Received an Associate Degree in Municipal Engineering at SWTI
- WWWOC La Crosse, Basic training was at SWTI
- Treatment plant math
- Wastewater (3)
- Lab classes
- ETN at Richland Center campus
- ETN session at Lancaster
- Wastewater lab quality assurance
- MATC sewer and water courses
- Telephone seminars
- DNR training
- Water works (3)
- Municipal engineering technician - SWTI
- Operator of wastewater treatment plants - Vol. II
- Six-day course

An "other" source of above training (Q 9.4) was Sacramento State University in California.

Suggestions for orientation/training of elected officials (Q 75) were:

- Inform the village board at their monthly meeting of any problems or changes I am aware of.
- Through seminars, officials should be made more aware of the time and experience it takes to be and stay a good operator.

- Short classes on budgeting and general operations, night classes at various locations, sources of funding.

- Since most officials work during day, evenings or Saturday sessions on operator's responsibilities and regulations should be given. (2)

For Q 125, the suggestions for orientation/training of elected officials were:

- In-plant tour
- Mailings of DNR Regulations
- Elected officials should be made aware of requirements for running a wastewater treatment plant through workshops or seminars.
- Classes in budgeting and general operations, night classes in sources of funding
- Since most officials in small communities work during day, sessions should be held on Saturdays or evenings
- Make it a requirement for something similar to our operator's certification program.

"Other" suggestions (Q 76) were:

- Have a person from the Insurance Service office give operators a demonstration on how operators can perform fire flow tests, static, residual, and use a pilot gauge. SEEN, video, or Voc-tech. Public relations on inspections for cross-connections, well abandonment, and general meter testing, complaints, water conservation program, flushing hydrants, broken services, general maintenance on the distribution system.

For Q 126, the "other" suggestions were:

- Have school or lessons closer to home and have the classes on something that pertains to our plant or lagoons

- Troubleshooting an activated sludge plant, for below the water level problems

- Record Keeping for maintenance, public relations regarding sludge disposal

- Recognition of employees for a job well done

- All items in questionnaire should be touched upon during continuing education

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects/topics are included in the water utility and wastewater systems sections.

Training Needs for various categories of personnel indicated by ten superintendents of both water utility and wastewater plants were as follows:

1. Laboratory Technician: DNR & EPA Regs, Fecal coliform, Reviewing testing procedures with a DNR representative, Lab quality assurance

2. Operator Personnel: Preventative Maintenance, Should have a certified employee as a back-up person, More short school sessions on process control for activated sludge, Yes (2)

3. Maintenance Personnel: Automated Equipment Repair, Pump maintenance, How a program can be started and maintenance sheets obtained, General plant maintenance school, Yes (2)

4. Administrative Personnel: Budget preparation, Sources of funding, How an inventory budget plan could be set up

5. Supervisory Personnel: Sources of funding, Leadership skills, Better public relations, Job orientation

6. Other Training Needs: Sources of funding (2). The need for supervisor and operator to obtain and understand utility management from clerks of utilities. Time management, Administrative skills, Orientation of elected officials, a definite meed to educate our officials concerning our job responsibilities and rules and regulations, general seminars for elected officials to make them aware of time spent by operators at Voc-tech or High School.

Refer to Table 27 and Appendixes D, F, and H for additional rankings and response rates to subjects/topics for desired training.

VII

FINDINGS/RESULTS FOR VTAE DISTRICT FOUR - MADISON AREA

Table 54 indicates that 41% of the respondents were employed in wastewater systems only.

Table 54

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)

(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	25	29
Wastewater System only	35	41
Both Water Utility & Wastewater Systems	18	21
Not Working in Either Water Utility or Wastewater	7	8
TOTAL	85	99

General Findings in Water Utility Systems

The "other" job titles/job classifications (Q 3.5) reported were:

- Engineering
- Water Supply Supervisor
- Meter Tester
- Manager
- Serviceman - Foreman, meter records
- Lineman
- Water Utility Board Member
- Chief Serviceman
- Repair mains and take water test only

Subject areas of recent training/education relevant to job were:

- DNR class held in March 1973
- Hydraulic transients
- 6 weeks special training
- Water and wastewater management
- DNR school for water operators (2)
- Operating training, water quality
- ETN, HRS.
- Waterworks operator certification course (4)
- Electric wiring experience
- Water school Portage
- Operator certification school and continuation seminars
- National and state conventions
- Meter School
- Hot line school
- URD school
- Maintenance
- School for GDL certification
- Iron removal

- Legal aspects of construction contracts

The "other" sources of training (Q 9.4) were:

- U. W. Madison
- Ft. Atkinson
- Course from Michigan State University
- Electrical contractor
- School in Illinois
- Conventions

One person suggested mailing training information directly to him (Q 11). Another suggested hands-on training (Q 74.10)

Suggestions for orientation/training of elected officials (Q 75) were:

- Each elected official should take it upon himself to contact the head of each city department to visit the facility and see how it works.

- DNR could put together and present various slide programs at council or town meetings. Informational mailings to same groups.

- Keep politics out of utility!

- Workshops on rules and regulations, general water information.

- Use personnel with "hands-on" experience they relate to utility needs and experience.

- Under manager form of government, promote one councilman to represent the city utility. This person then to attend pertinent meetings.

- Regulatory agencies should present requirements to officials rather than rely on operators.

"Other" suggestions (Q 76) were:

- Should be better communication between management and workers to build trust and give compliments to those who put out 110%. Most employees get the feeling they are not part of overall operation.

- I would be glad to help in any way - please call.

- My job requires 24 hour availability, so have little opportunity for classes I would like to take.

- End each day by 3:00 p.m. for travel.

Waterworks Certification

The most commonly desired certification was Iron Removal (I) (16 percent response).

Continuing Education/Training Desired in Water Utility Subjects

Fifty percent (50%) or more of the 44 respondents to Form B desired training in the following subjects/topics:

Leak Detection and Repair
Preventative Maintenance
Pumping Equipment Maintenance
Distribution System Maintenance
Cold Weather Operations
Emergency Operations

Training needs for various categories of personnel indicated by two (2) water utility superintendents were as follows:

1. Laboratory Technicians: Vac analysis, proper sampling techniques, flouridation, chlorination
2. Operator Personnel: Care of equipment, DNR/PSC requirements
3. Maintenance Personnel: Preventative maintenance, hands-on pump and electric maintenance, pumps and meters, yes training is needed.
4. Administrative Personnel: Response to public, review of administrative code, PSC/DNR regulations (2)
5. Supervisory Personnel: Personnel management, delegating jobs, communications, operational standards.
6. Other Needs: Public relations, sources of funding, time management, communications, math and science refresher.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were indicated as follows:

- Engineering
- Chief Engineer and Director
- Consultant (Process Engineer)
- Wastewater Utility Foreman
- Part-time
- DNR area Engineer
- Collection System Foreman

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Math at MATC
- Chemistry at MATC
- Wastewater course at MATC
- Wastewater operators training sessions (4)
- MSU Supervisory Management
- Financial Management
- MATC courses 101, 102, 103, 104, 106, 111, 113, 116
- DNR classes

- Clarifier optimization
- Water and wastewater principles - MPTI (2)
- Short Course
- Engineering Principles and chemistry
- Operation of clarifiers
- Civil Engineering
- Management Skills Training
- Chemistry
- Management/Supervision (2)
- Collection Systems Maintenance (2)
- Accounting
- Activated Sludge
- Fecal coliform Testing
- Advanced Trickling Filters
- Sanitary Engineering
- Pumps
- Public Works Construction Inspection

Some "other" sources of the above training (Q 9.4) were indicated as follows:

- UW - Platteville (2)
- AMSA Conference
- Mail order through WPCF
- UW - Madison
- Correspondence course from Sacramento, California
- Self Study
- Mid-States Associates, Inc., Baraboo
- UW - Stevens Point

Two "other" suggestions for ways to find out about training courses (Q 11.9) were mailings from MATC (2) and by correspondence.

Suggestions for orientation/training of elected officials (Q 125) were:

- Very much is needed, they would have to feel the need, can't be forced.
- Must be done through seminars of general appeal such as current government affairs seminar and DNR seminars.
- How do you get public officials to your plant? Public Education regarding importance of job and plant equipment
- Have an open house with their involvement.
- Officials should have a short introductory course in wastewater treatment. Perhaps at a council meeting.
- Plant tours.
- Presentation by DNR or WPCF at a regular monthly meeting of city council regarding daily operation, certification, pollution and environmental concerns.
- The city manager reports to elected officials twice monthly.
- Have a required meeting for them once per year at about 10 locations around the state on the importance of wastewater treatment.
- Good idea. Explain DNR requirements of operators and officials. Explain what the NPDES permit is and what it means.
- Make it mandatory.
- Familiarization with processes. Possible emergency situations.
- Use people who have had hands-on experience.

- I think it is necessary to have an individual who has been certified him/herself.
- Prepare audio-visual or video presentation on operations.

Other suggestions (Q 126) were as follows:

- I'd like to see a lot more training done to really elevate this profession, pay must also improve.

- It is necessary to get cooperation and input from all the agencies listed in #1, 2, 3. Use each group's strengths with one agency taking the lead.

- Courses could be presented a little better with better prepared instructor.

- Would like to see compensation for those who would like to improve themselves. We have a closed union shop that represents sewer, water and public works department in the same bargaining unit telling us that we are treated the same as other cities and doesn't seem interested in our need for keeping up-to-date with changes in the field.

- Re-write DNR exams.

- Consider information coming from EPA vs. DNR.

- Develop workbook(s) that relates directly to material given on certification exams. Uniform exams in order to have only one answer possible - not to vary for a person from a small or large plant. For example: How often should drip pots be drained? The best answer is once a day. The plant I come from, if we drained some only once a day, it would take a person 90 minutes to drain it.

Wastewater Certification

The most common desired certifications were Grade 4, General Introduction (28 percent) and Disinfection (E) (26 percent). Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Forty-seven percent (47%) or more of the 53 respondents to Form C desired training in the following subjects/topics: (In rank order)

- Cold Weather Operations
- Shock Load and Toxicity Problems
- Corrective Maintenance
- Preventative Maintenance
- Infiltration and Inflow Identification
- Industrial Monitoring
- Supervision of Personnel

Training needs for various categories of personnel indicated by ten superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Starting up new lab, Lab quality assurance control (4), Yes, How to make laboratory grade water for your plant,

Instrumentation (2), Troubleshooting procedures (2), Qualitative and quantitative analysis, Toxic organics analysis methods

2. Operator Personnel: Practical thinking and understanding the biological side of treatment, Yes, Winter operations, Instrumentation, General plant safety, Emergency operations, Qualitative and quantitative work, Get them to know more about technical data, computer interaction, process control, Nitrification, ultraviolet disinfection, Pond operation, fecal and chlorine testing, need more biology of a system and how it all works together.

3. Maintenance Personnel: More preventive maintenance planning, Yes, Use of computers for maintenance programs, Troubleshooting, Safety and basic electricity, Maintenance of plant instrumentation, Expanded preventive maintenance, Telemetry electronics, Pumps, Preventive maintenance.

4. Administrative Personnel: More long range planning while staying on top of day-to-day events, orientation of elected officials, Budget planning (2), Record Keeping, Improving administrative skills, Energy conservation, Working with town boards and public realtions (2), Time management.

5. Supervisory Personnel: How to motivate and handle people, Use of computers in operations scheduling, Supervisory skills, Emergency operations, Organization, able to relate administration to operation for employees, Time management, Employee relations.

6. Other Training Needs: Specific areas of upgrading, Public relations, Orientation of elected officials (2), Sources of funding (2), Leadership skills, Administrative skills, Problem-solving, Interpersonal relationships, Time management, Communications, More classes directed toward collection system maintenance, Form C #40, 42, 43, 44, 46, 47, Chemistry microbiolology, Math, physics, qualitative and quantitive.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training in wastewater subjects/topics.

General Findings from Personnel Working in Both Systems

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Wastewater treatment
- Wastewater operations class (2)
- Waterworks operations class (2)
- Flouride class
- Engineering
- Wastewater lab
- VTAE courses in wastewater and goundwater
- Environmental engineering

The WWWOC was listed as an "other" source for the above training (Q 9.4).

Suggestions for orientation/training of elected officials (Q 75) were:

- A one-day per year Saturday session is badly needed to train elected sanitary district commissioners on: (1) Their responsibility to their system and to the state, and (2) the responsibilities of their superintendents/operators to them and to the state. This should be scheduled shortly after the April election.

- Sessions held by DNR or AWWA

- One or two training sessions per year

- Newsletter to superintendent

For Q 125, the suggestions were:

- A one-day Saturday session per year on their responsibilities as well as the responsibilities of the superintendents/operators

- One or two training sessions per year

- Newsletter to superintendent

"Other" suggestions (Q 76) were:

- One area that seems to be overlooked is the operator of small systems (under 500 services). These people tend to be part-time who have other full-time jobs and many do not have the time available to take a six-day session (3 days each week for 2 weeks) to prepare them for operator certification. They have other employers to which they are responsible.

For Q 126, the "other" suggestions were:

- Part-time operators don't have time for lengthy sessions because of other full-time jobs. Consideration should be given to more qualified people.

- It is discouraging to go to classes and all they talk about is large plants, computers, big testing labs SVI, FM, SRT, MCRT, etc. I would like to hear more about small plants.

Continuing Education/Training Desired by Personnel in Both Systems

Response to specific subjects/topics are included in the water utility and wastewater works sections.

Training Needs for various categories of personnel indicated by six superintendents of both water utility and wastewater systems were as follows:

1. Laboratory Technicians: General lab, Yes (3)

2. Operator Personnel: Safety, Yes (4)

3. Maintenance Personnel: Preventative maintenance, cold weather operations, Yes (2)

4. Supervisory Personnel: Supervision of personnel

Refer to Tables 20 and 27 and Appendixes B, C, D, F and H for additional rankings and response rates to desired training.

VIII

FINDINGS/RESULTS FOR VTAE DISTRICT BTI - JANESVILLE AREA

Table 55 indicates that over half of the respondents were employed in wastewater systems only.

Table 55

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	6	26
Wastewater System only	12	52
Both Water Utility & Wastewater Systems	4	17
Not Working in Either Water Utility or Wastewater	1	4
TOTAL	23	99

General Findings in Water Utility Systems

Subject areas of recent education/training received relevant to the job (Q 8) were:

- Beloit school for certification
- Water products seminar March 1983, equipment used in maintaining water system, valves hydrants, etc. (2)
- ETN - water works operators
- Organic chemistry

One person indicated the above was obtained at UW - Rock County (Q 9.4).

Two people indicated the best way to find out about training courses (Q 11.9) was through salesmen.

"Other" suggestions (Q 76) were:

- No crash programs. Designed (down graded) so all parties can benefit by it.

Waterworks Certification

Only one person desired certification in Surface Water (S). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Sixty-four percent (64%) or more of the 11 respondents to Form B desired training in the following subjects/topics: (In rank order)

DNR Requirements for sampling, reporting and operation
Safety
Pumping, Equipment and Controls
Water Meter Maintenance and Repair
Water Meters Testing
Preventative Maintenance

Training needs for various categories of personnel indicated by 2 water utility superintendents were as follows:

1. Operator Personnel: It should be done (2)

2. Maintenance Personnel: It should be done (2)

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classification (Q 3.5) were as follows:

- Operator in training
- Leadman and shift operator
- I do everything from A to Z
- Chief Operator
- Civil/Sanitary Engineer

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- General Introduction wastewater, pri.-settling, lab, disinfection, anaerobic digestion trickling filters. (by operator in training) (2)
- 2 weeks BTI, 2 weeks DNR Madison
- GED BTI
- Running a fecal coliform test
- Management/Supervision
- Ammonia Course
- Advanced wastewater treatment course
- Advanced activated sludge course
- Mechanical sludge handling
- Activated sludge
- Civil Engineering

"Other" sources of above training (Q 9.4) were: From another operator and UW-Madison.

Suggestions for orientation/training of elected officials (Q 125) were as follows:

- They could be more informed on daily plant operations
- More workshops and laboratory experience
- More information on potential penalties for falsifying monthly reports

"Other" suggestions (Q 126) were as follows:

- I would very much like to see the DNR cert. exams given after the conclusion of each course instead of just so many times a year.

- Change or eliminate "practice exams" for operators. They are important but difficult to schedule. I don't feel that an operator should have to pass all sub-classes before taking the "practical exam."

- Publish and distribute to major cities, the economic penalty of sewer moratoriums, fines and other punitive actions taken. List the municipalities who are under such action.

Wastewater Certification

The most commonly desired certification was Grade 3, Laboratory (J) (38 percent response). Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Sixty-three percent (63%) or more of the 16 respondents to Form C desired training in the following subjects/topics.

- Preventative Maintenance
- Corrective Maintenance
- Safety
- Lift Station Maintenance/Troubleshooting
- Shock Loads and Toxicity Problems

Training needs for various categories of personnel indicated by five superintendents of wastewater plants were as follows:

1. Laboratory Technicians: More time spent on training program, courses in changing ways, laboratory experiences, better schools for quality assurance programs, yes.

2. Operator Personnel: Refresher courses, schooling geared for the advanced WWTP operations.

3. Maintenance Personnel: More on lift stations, update personnel, maintenance, schooling dealing with technical equipment, not valves, etc., yes.

4. Administrative Personnel: More interest in wastewater operations, updating on new state and federal laws regarding affluent limits, changes in operational requirements, etc.

5. Other Training Needs: Orientation of elected officials, budget preparation.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel in Both Systems

The "other" job title classification (Q 3.5) listed was Assistant Operator (PT).

Subject areas of recent education/training received relevant to the job (Q 8) were: Water and wastewater, operators and maintenance and engineering.

A suggestion for orientation/training of elected officials (Q 75) was: To understand the job and DNR rules.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects/topics for the VTAE district are included in the Water Utility and Wastewater Works sections.

Training needs for various categories of personnel indicated by one superintendent of both water utility and wastewater plant were as follows:

1. Laboratory Technicians: Modern lab equipment, quality assurance.

2. Operator Personnel: Industrial monitoring.

3. Maintenance Personnel: Preventative maintenance.

4. Other Training Needs: Safety.

Refer to Table 27 and Appendixes D, F and H for additional rankings and response rates to desired training subjects/topics.

IX

FINDINGS/RESULTS FOR VTAE DISTRICT GTI - KENOSHA AREA

Table 56 indicates that nearly 60% of the respondents were employed in wastewater systems only.

Table 56

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	13	39
Wastewater System only	19	58
Both Water Utility & Wastewater Systems	1	3
Not Working in Either Water Utility or Wastewater	—	—
TOTAL	33	100

General Findings in Water Utility Systems

The "other" job titles/job classifications (Q 3.5) reported were: Civil Engineer and Power Plant Superintendent II.

Subject areas of recent education/training received relevant to the job (Q 8) were:

- Sanitary Engineering courses - graduate school level
- Management course at Madison
- Water and wastewater at WCTI
- Management
- Flouridation - 1982
- Ground Water distribution
- Schooling for certification
- DNR distribution course
- Water treatment plant design - UWEX

The "other" source of training (Q 9.4) was AWWA seminar. Mailing lists were suggested as the best way to find out about training sessions (Q 11.9)

A suggested method for orientation/training of elected officials (Q 75) was on-site visitation.

Waterworks Certification

The most commonly desired certifications were in Zeolite Softening (Z), Lime Softening (L) and Surface Water (S), each at 15 percent response rate. Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Seventy-seven percent (77%) or more of the 13 respondents to Form B desired training in the following subjects/topics:

- Distributive Systems
- Distribution Systems Maintenance
- Safety
- Leak Detection and Repair
- Emergency Operations

Training needs for various categories of personnel indicated by four water utility superintendents were as follows:

1. Laboratory Technicians: Qualification, MCL testing, proper use of equipment, when and how testing should be done.
2. Operator Personnel: New methods, telemetry, responsibility, operation by computer, safety at all locations, hands-on operations, it should be done (2)
3. Maintenance Personnel: Plant maintenance-mechanical, electrical, distribution system maintenance, knowledgeable, electronic maintenance, when and how it should be done, hands-on performance, it should be done (2)
4. Administrative Personnel: Leadership, what to do about losses.
5. Supervisory Personnel: Leadership skills, information, management skills, availaility of state and Federal funding.
6. Other Needs: Informatinal meetings, public relations, budget preparation, administrative skills, communications, time management, sources of funding, problem-solving.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Works Systems

"Other" job titles/classification (Q 3.5) were indicated as follows: Chief Operator, Manager, and Operator - Part-time (I have many other things rather than wastewater plant).

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Membrane filtration analysis
- General introduction of wastewater and laboratory (3)
- Computer use
- Wastewater ponds and lagoons (2)
- Graduate courses in pollution, biology
- Electricity - Industrial electronics
- Sludge management workshop
- Sacramento #3
- Primary settling (2)
- Activated sludge
- Physics
- Disinfection
- Wastewater laboratory (2)
- Wastewater Grade III training in plant and lab
- Management course
- Operation of wastewater treatment plants - Vol. III Sacramento course
- Earth Science

"Other" sources of above training (Q 9.4) were: State lab of hygiene, WU-Whitewater, Sacramento, and UW-Parkside

An "other" suggestion for finding out about training course (Q 11.9) was to inform the people on certification exam days.

Suggestions for orientation/training of elected officials (Q 125) were:

- Any way possible - they and supervisors need to understand laws and regulations, safety aspects, costs, etc.

- They (commissioners, presidents, mayors) should be required by law to attend a certain number of hours of education and training - same as operator. It seems ludicrous that well-trained conscientious certified operators should be responsible to the state and to local officials who may not know anything about water and sewage treatment. They seem to care only about how much is it going to cost. They seem to down play our professional advice

- News media

- Short orientation for elected officials on importance of wastewater personnel and what is all involved in running a plant (1)

- Plant tours

- Maybe they should be required to be certified to a certain degree.

"Other" suggestions (Q 126) were as follows:

- Dinner meetings should not count as continuing education credits. Supervisors attend these and operators have to go to school. Hand out credits after the sessions to each individual who has completed the entire session. Too many people duck out!

- Sometimes the rules and regulations appear nit-picky and inconvenient, especially when we have other jobs.

- I suggest the Sacramento course #3 be taught to others. It is advanced enough to keep people's interest but not over anybody's head.

- Maybe a class on improving community relations.

Wastewater Certification

About one-fifth of the respondents desired certification in Grade 4 for most of the subgrades. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Fifty-three percent (53%) or more of the 19 respondents to Form C desired training in the following subjects/topics:

- Industrial Monitoring
- Preventive Maintenance
- Characteristics of Wastewater
- Flow Measurement
- Industrial Pretreatment
- Laboratory Quality Assurance
- Sampling for Process Control
- Use of Microcomputers in wastewater operations

Training needs for various categories of personnel indicated by seven superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Quality control (3), Computer use, training needed.

2. Operator Personnel: Basic operation, sampling, troubleshooting, computer use, new regulations, yes (2), plant operation.

3. Maintenance Personnel: Preventive maintenance (2), troubleshooting, computer use, new techniques, time maintenance record keeping, on-the-job safety.

4. Administrative Personnel: Inventory control, record keeping, computer use, new regulations.

5. Supervisory Personnel: Leadership skills, discipline, grievance handling, new regulations.

6. Other Training Needs: Communications, time management, interpersonal relations, problem-solving.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel Working in Both Systems

No other job titles or subject areas of education were reported, except that the AWWA state convention was listed as another source for training (Q 9.4).

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects/topics are included in the water utility and wastewater works sections.

The one superintendent of a both water utility/wastewater works system indicated that training was needed for maintenance personnel.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

X

FINDINGS/RESULTS FOR VTAE DISTRICT WCTI - PEWAUKEE AREA

Table 57 indicates that 39% of the respondents were employed in wastewater systems only.

Table 57

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	14	32
Wastewater System only	17	39
Both Water Utility & Wastewater Systems	9	20
Not Working in Either Water Utility or Wastewater	4	9
TOTAL	44	100

General Findings in Water Utility Systems

Several "other" job titles/classifications reported were as follows:

- Administrative Assistant
- Construction
- Chemical man, Relief pump operator
- Chief engineer
- Meter Repair
- Foreman - Meter Dept.

The subject areas of recent education/training relevant to job (Q 8) were reported as follows:

- Water works operator course (2)
- Electronics (2)
- Groundwater monitoring
- Business Accounting and Management
- Zeolite Softening, Columbus, Wisconsin
- Leak Detection
- Cold Weather Problems
- Goundwater and Distribution course for GD certificate
- Electricity for water and wastewater
- ETN operator sessions (2)
- M. S. in Management
- Cross-connections
- Management Training
- Use of computers in a water utility

"Other" sources of the above training (Q 9.4) were: military service, NWWA - Ohio State University, and Cardinal Stritch College.

A suggestion for orientation/training of elected officials (Q 75) was to develop intensive two-hour programs specifically for them.

Other suggestions (Q 76) were:

- The instructors have to be thoroughly versed and experienced in their subject matter.

- Maintenance of water works equipment, especially pumps.

Waterworks Certification

The most commonly desired certification was in Lime Softening (L) (17 percent response). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Fifty-eight percent (58%) or more of the 24 respondents to Form B desired training in the following subjects/topics:

Preventative Maintenance
Safety
Pumping Equipment Maintenance
Unaccounted For Water
Leak Detection and Repair
Water Meters Testing
Water Meter Maintenance and Repair

Training needs for various categories of personnel indicated by two water utility superintendents were as follows:

1. Laboratory Technicians: Chlorine and flouride applications.

2. Operator Personnel: Importance of safe water

3. Maintenance Personnel: Well pumps, water softening, piping, valves, good record keeping.

4. Administrative Personnel: Budgeting, record keeping.

5. Supervisory Personnel: Safety problems, stress programs

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were:

- Supervisor (2)
- Chemist/Operator
- Operator Supervisor
- Manager
- Director Public Works
- Operator-Laborer

Subject areas of recent education/training recently received relevant to the job (Q 8) were reported as follows:

- Anaerobic digesters
- Quality assurance lab
- Sludge, land application (2)
- Building and grounds - operation and maintenance
- Short courses and classes
- Management (3)
- Electrical
- Corrosion studies
- Operation of wastewater treatment plants III
- Advanced activated sludge at WCTI
- Water chemistry
- Hydraulics
- Microbiolology
- Four year associate degree - Electronics
- Laboratory analysis of ammonia,

- Wastewater treatment and regulations (3)

nitrogen, phosphorus
- Two-day course on lab work
- Phosphorus removal

"Other" sources of the above training (Q 9.4) were:

- General workshops
- Carroll College
- Michigan State University
- Bay de Noc Community College, Escanaba, Michigan

"Other" suggestions for finding out about training courses (Q 11.9) were personal mailings and other mailed literature.

Suggestions for orientation/training of elected officials (Q 125) were:

- Our aldermen are very busy people. Direct mailing of information is probably the best way.

- Get the operation of wastewater and water treatment out of hands and pockets of elected officials. Most plants are funded mainly by government and overseen by DNR and EPA anyway.

- Basic training in wastewater is needed to get officials to show more interest in operation of plants. This may cut the red tape and wasted time at budget approvals and capital improvements.

- All elected officials should be required to take George Walker's Voc-tech course, "Improving Managerial Performance" and required to visit their plants once each year for an orientation of operations, maintenance and how management is being handled.

- Tour facilities, review income, expenses, and accounts, ordinances.

"Other" suggestions (Q 126) were:

- Eliminate "grandfather" clause on certification rules. All operators who received Grade 4 license when rules were changed several years ago should have to pass exams for a given sub-class. Many cannot pass them, yet, these are the people setting rules for new people. Doesn't make sense.

- Keep subject matter to the points needed to improve! Keep tests steady and not far out for operations.

- The questionnaire is well done. Seeking training from a choice of 80 topics is very generous.

- The water quality of the state and USA should be a Federal or state concern.

- I find it difficult to successfully complete the requirements. Courses at Voc-tech schools inadequate. They don't prepare us for the questions on the exams. They are limited and not offered at proper time. Testing only 3 times per year rather than 4 requires longer time to complete all requirements. DNR officials already have full workload. Maybe assistants could be hired. At present time, there doesn't seem to be anywhere to go to get the information I need to know.

Wastewater Certification

The most commonly desired certifications were in Grade 4, Activated Sludge (C) and Stabilization Ponds/Aerated Lagoons (D) (Both at 32 percent response rate). Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

At least forty-three percent (43%) of the 28 respondents to Form C desired training in the following subjects:

- Shock Loads and Toxicity Problems
- Preventative Maintenance
- Flow Measurement
- Cold Weather Operations

Training needs for various categories of personnel indicated by eight (8) superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Keep up with procedure changes, Instrumentation, To understand compliance regulations, Questionnaire items # 50, 51, 52, 57, 85, 86, 87, 88, 112, 113.

2. Operator Personnel: General operations (2), anaerobic digestion, sand filters, reord keeping, laboratory skills, to be able to consistently and accurately operate waste treatment equipment, safety (2), questionnaire items # 73-78, 112, 113; troubleshooting.

3. Maintenance Personnel: General maintenance, record keeping (2), maintenance systems, instrumentation, questionnaire items # 94, 95, 104, 105, 106, 112, 113; cleanliness, safety (2).

4. Administrative Personnel: Public relations, administrative skills, to keep current with regulations and interpretations, questionnaire items # 98, 99, 108, 111, 112, 113.

5. Supervisory Personnel: Leadership skills, oral communications, documentation, questionnaire items # 98, 99, 107-114; people management.

6. Other Training Needs: Concentrate on administering and interpreting of regulations until they are understood by regulator and regulatee. Then concentrate on various operational skills, fine-tuning, economics, efficiencies, etc. All elected officials required to take George Walker's course, "Improving Managerial Performance," and tour facilities for orientation on operation, maintenance and management. Combating the imbalances in the activated sludge process and the corrective steps necessary to produce a satisfactory effluent.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel Working in Both Systems

An "Other" job titles/classification (Q 3.5) was indicated as Manager.

Subject areas of education/training recently received relevant to the job (Q 8) were reported as follows:

- -Wastewater Operations III
- -Certification - continuing education
- -Various seminars pertaining to water and wastewater utilities
- -B. S. Biology at UW-Whitewater
- -The water/wastewater courses offered at WCTI

"Other" places for receiving the above training (Q 9.4) were River Falls College and UW-Whitewater.

One "other" means of finding out about training sessions (Q 11.9) was to send out notices.

Suggestions for orientation/training of elected officials (Q 75) were as follows:

- Invite officials to general introductions
- In-plant tours, show maintenance routines. Have suppliers support maintenance and show what the costs are. Communicate how professional our job is or can be if they elevate it to that status.

Under Q 125, the following were reported:

- Don't like union in training
- Plant tours, show maintenance routine

One "other" suggestion (Q 126) was to conduct classes nearby.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects/topics are included in the sections on water utility and wastewater training needs.

Training needs for various categories of personnel indicated by three superintendents of both water utility/wastewater plants were as follows:

1. Operator Personnel: Hands-on training.

2. Maintenance Personnel: Hands-on training

3. Other Training Needs: Communications, some people should be reminded that we are hired to treat sewage.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

XI

FINDINGS/RESULTS FOR VTAE DISTRICT MATC - MILWAUKEE AREA

Table 58 indicates that 51% of the respondents were employed in water utility systems only.

Table 58

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	28	51
Wastewater System only	20	36
Both Water Utility & Wastewater Systems	4	7
Not Working in Either Water Utility or Wastewater	3	5
TOTAL	55	99

General Findings in Water Utility Systems

Several "other" job titles/classifications (Q 3.5) were as follows:

- Manager
- Plant Supervisor
- Working superintendent, not limited to supervision
- Also billing
- Operations manager
- Utility Foreman
- Assistant City Engineer

The Subject areas of recent education/training received relevant to the job (Q 8) were:

- Ground water and distribution (2)
- DNR surface water (3)
- Water utility management
- M.S. Degree in Municipal Engineering
- ETN Seminars (5)
- Supervision and Management (3)
- Electrical maintenance for water quality
- Electrical - for water works operation
- Groundwater treatment (2)
- AWWA seminars
- Short course UW
- B.S. Degree in soils science, resource management
- Laboratory technician, maintenance
- BSME Degree
- Iron and zeolite
- Engineering
- Introduction to microcomputers

Some of the "other" sources for the above training were:

- Michigan State University
- University
- Michigan State University correspondence course
- On-the-job
- UW-Stevens Point
- UW-Madison (2)
- ETN-Wauwatosa Library

"Other" suggestions for finding out about training course (Q 11.9) were the AWWA Journal, DNR bulletin, contractors and salesmen.

Suggestions for orientation/training of elected officials (Q 75) were:

- Officials need to become aware of our problems and concerns in the water industry. Provide a conference for them and then try to get them to attend.
- Go to council meetings once a year and give brief overview
- The need for additional training in water utility operations and need for paying educational costs.
- Give them the exams
- On-site, technical professionalism in the industry, more PR for the needs.
- Luncheon seminars of about two hours could be held in various locations with an overview of problems facing utilities and benefits realized if problems solved.
- Remind them that water and its drinkability is assumed by most people on a public system and that poorly trained personnel may compromise that confidence.

"Other" suggestions (Q 76) were:

- Training is very important. DNR is good organization for small community to have training.
- WCTI is excellent tech school for these courses.
- Our interests lie mainly in maintenance, management of wells, reservoirs, towers, pumps along with distribution system. Cross-connection control, surveying and detection.
- Math for operating water utility, chlorine addition, consumer relations.
- How about some courses closer to Ozaukee county, i.e., MATC North?
- People who go to VTAE fall asleep.
- Ten (10) hours every two years is sufficient.

Waterworks Certification

The most commonly desired certification was Surface Water (S) (25 percent response). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Fifty-six percent (56%) or more of the 32 respondents to Form B desired training in the following subjects/topics:

- Leak Detection and Repair
- Preventive Maintenance
- Distribution Systems
- Pumping, Equipment and Controls
- Cold Weather Operations
- Emergency Operations

Training needs for various categories of personnel indicated by five water utility superintendents were as follows:

1. Laboratory Technicians: Quality control, sampling techniques, chlorination practices, SDWA requirements, record keeping.
2. Operator Personnel: Emergency situations, hydraulics, rules and regulations, total training and certification, chemistry of water treatment, cost saving methods of operation.
3. Maintenance Personnel: Electrical/Electronics (2), troubleshooting, safety, preventative maintenance methods (2), water-borne diseases.
4. Administrative Personnel: Planning (2), budgeting, PSC rules/regulations, public relations, personnel matters.
5. Supervisory Personnel: Scheduling work, dealing with unions and unionized personnel (2), language skills, basic skills.
6. Other Training Needs: Orientation of elected officials (2), water education programs within schools, speakers bureau, in-house training films, problem solving, math, obtaining funds, public speaking, training of new supervisors.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were as follows:

- Shift supervisor - wastewater/energy
- Administration - Collection System
- Shift supervisor (2)
- Supervisor - Schedule Maintenance
- Supervisor
- Manager Environmental Control
- Project Chemist
- Laboratory Supervisor

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- B.S. in Civil Engineering
- Pump course - MATC Mequon (3)
- Chlorination of MATC North
- Phosphorus at GTI
- Anaerobic digestion at WCTI
- Lab procedures training
- Pump maintenance
- Safety management
- Wastewater utility management
- Wastewater lab
- Lab quality contol
- Operation of wastewater plants - 3 (Sacramento course)
- Wastewater certification
- Process control seminar
- Business administration
- Lime management
- M.S. in Engineering (2)
- Engineering
- Management

"Other" sources of above training (Q 9.4) were indicated as follows: UW-Madison, MSOE, Michigan State University, Marquette University, UW System, UW Milwaukee, company sponsored.

Suggestions for orientation/training of elected officials (Q 125) were:

- Have them meet with workers (not supervisors) on the job to see operations.
- Suggest it be offered at District Headquarters. Need for upgrading treatment system with current cost of building new facilities.
- Plant visitation, on-site inspection of problems, stream problems, solutions.
- An evening overview after elections, perhaps include a tape of presentation from each plant.
- Most elected officials aren't interested in municipal wastewater facilities. However, those that are should be given a chance for training.
- Follow-up interviews in municipalities that have permit problems. Let them know how programs help community.

"Other" suggestions (Q 126) were as follows:

- Replace DNR instructor. Remove some math from exams.
- Training should be as close as possible to facility where operators work. I find it too far to travel to some sessions.
- Reference material should be given for the exam, or taught in the classroom. All exam questions should be taught or studied or come from text book.
- Upgrade Voc-tech course instructors.
- Assist WWWOC in specialty program to meet advanced training and management training needs.
- Cost for training should be kept to a miminum.
- Encourage management personnel to encourage employees to seek continuing education.

Wastewater Certification

The most commonly desired certification was Grade 4, Disinfection (E) (41 percent response rate). Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Thirty-seven percent (37%) or more of the 27 respondents to Form C desired training in the following subjects/topics: (Rank Order)

Sludge Pumping Equipment
Used Microcomputers in wastewater operations
Safety
Shock Loads and Toxicity Problems
Sludge Pumpings Procedures
Activated Sludge Process Control
Emergency operations
Corrective Maintenance
Preventative Maintenance

Training needs for various categories of personnel indicated by five superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Instrument analysis, general training and certification.

2. Operator Personnel: Computerized process, instrumentation use, basic math, electroplating wastewater treatment, general training and certification.

3. Maintenance Personnel: Electronics, instrumentation maintenance.

4. Administrative Personnel: Management.

5. Supervisory Personnel: Communication, delegation, first-line supervisory training

6. Other Training Needs: Public relations, budget preparation, sources of funding, leadership/administrative skills, problem-solving, parliamentary procedures, communications/inter-personal relations, bring training to the job site for O & M people, special course for officials on wastewater treatment and their role in policy making.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel in Both Systems

"Other" job titles/classifications (Q 3.5) were reported as follows: Village engineer and commissioner of public works, and village employee.

Subject areas of education/training recently received relevant to the job (Q 8) were: Associate Degree, and Urban storm water run-off.

One "other" means of finding out about classes (Q 11.9) was: UW - Extension announcements.

A suggestion for orientation/training of elected officials (Q 75) was: They should go out in the field and see how bad the water and wastewater systems are, and the high cost to fix problems.

One "other" suggestion (Q 76) was: Set up courses applicable only for water distribution system. I'm not interested in water softening, lime removal, etc.

For Q 126, the "other" suggestion was: Set up courses applicable only to sanitary sewer collection system. I have no responsibility for wastewater treatment plant.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects are indicated in the sections on continuing education/training in water utilities and wastewater systems.

There were no superintendents of "combined" systems reporting any training needs.

Refer to Table 20 and 27 and Appendixes B, C, D, F and H for additional rankings and response rates to desired training.

XII

FINDINGS/RESULTS FOR VTAE DISTRICT MPTI - FOND DU LAC AREA

Table 59 indicates that over one-third of the respondents were employed in either wastewater systems only or in both water utility and wastewater systems.

Table 59

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	16	23
Wastewater System only	26	38
Both Water Utility & Wastewater Systems	25	36
Not Working in Either Water Utility or Wastewater	2	3
TOTAL	69	100

General Findings in Water Utility Systems

"Other" job titles/classification (Q 3.5) were as follows:

- Chief water works operator
- Manager
- Assistant Superintendent and Water Plant Manager
- Engineering Aide and fill in as operator and maintenance

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Iron Removal, Seminar at Columbus 2-1-84
- Civil engineering
- Institution fire safety
- Groundwater treatment
- Water works laboratory
- Chlorination and chlorinator repair
- All types of seminars on water utilities (2)
- Management
- ETN sessions
- AWWA convention seminars in Milwaukee
- Iron removal seminar

"Other" sources of above training (Q 9.4) were as follows:

- Marquette University
- Federal correction training - Boulder, Colorado
- UWM Campus - West Bend
- AWWA Convention

Suggestions for orientation/training of elected officials (Q 75) were:

- Utility Committee - cable TV
- Have DNR or PSC send reports, etc. to local newspaper
- Have them tour plant
- Night courses - they need more knowledge

"Other" suggestions (Q 76) were:

- Conduct classes at different utilities on a rotating basis to learn something from host utility.
- Keep up the continued training.

Waterworks Certification

The most commonly desired certification was Iron Removal (I) (30 percent response). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Fifty percent (50%) or more of the 40 respondents to Form B desired training in the following subjects/topics:

Unaccounted for Water
Pump, Equipment and Controls
Preventative Maintenance
Leak Detection and Repair
Distribution System Maintenance
Pumping Equipment Maintenance

Training needs for various categories of personnel indicated by five water utility superintendents were as follows:

1. Laboratory Technician: Impress the need for accuracy (2).

2. Operator Personnel: Construction/maintenance safety, contamination hazards, basic softening knowledge, training is needed (2).

3. Maintenance Personnel: Proper scheduling of maintenance, knowledge of pumps and equipment, the importance of maintenance program, training is needed.

4. Administrative Personnel: Customer relations.

5. Supervisory Personnel: Customer relations, leadership skills.

6. Other Training Needs: Public Relations, leadership skills, problem-solving, time management, communications

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were assistant superintendent/operator supervisor, and back-up operator and maintenance.

Subject areas of education/training recently received relevant to the job (Q 8) were indicated as follows:

- DNR course at MPTI
- Mequon Tech, MPTI
- Soil Testing
- Wastewater management course
- Advanced trickling filter/RBC
- Two-year wastewater tech program at MPTI (3)
- Chemistry and calculus
- Laboratory
- Student water and wastewater technology
- Lab, application of sludge to soil
- B.S. Degree in biology and general science
- Land application of sludge
- Management and supervision
- Electrical maintenance
- Dale Carnegie course

"Other" sources of the above training (Q 9.4) were State University, UW-Stevens Point, and Dale Carnegie, West Bend.

Mailings were suggested as an "other" way to find out about training courses (Q 11.9).

Suggestions for orientation/training of elected officials (Q 125) were indicated as follows:

- Environmental lobbyists

- You can lead a horse to water, but you can't make him drink.

- On this question it is impossible to put into words what I would like to say. Call me.

- Seminars given every so often, maybe annually (2)

- They should be able to understand the process involved in wastewater treatment and the time it takes to operate a plant. The importance of preventative maintenance.

- Send copies of WWWOC Clarifer, DNR Certified Operator to them.

- Council members should tour facility and talk with personnel

"Other" suggestions (Q 126) were:

- DNR certification tests seem designed to confuse the operator, instead of as an aid to help him learn. The DNR seems more concerned with tricking and profiting from the operator than training him to do his job better.

- I would like to see some way of forcing superintendents to allow operators to get additional education on union time.

- More advance material needed.

- Training should be given by an experienced operator.

- A set of standards learned from one large text-workbook course including cassettes. Each area of study would cover all DNR sub-grades in one grade. Upon completion the operator could take all sub-grade exams. Under present system operators take test, if fail, they go to review session and keep up process until passed. Improve tests to include operational knowledge.

- There is a need to address industrial physical and chemical systems.

Wastewater Certification

Over one-fourth of the personnel desired certification in Grade 4 in most of the subgrades. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Forty-five percent (45%) or more of the 51 respondents to Form C desired training in the following subjects/topics:

- Cold weather operations
- Infiltration and Inflow Identification
- Blower and Aeration Equipment
- Shock Loads and Toxicity Problems

Training needs for various categories of personnel indicated by eight superintendents of wastewater plants were as follows:

1. Laboratory Technician: Basic chemistry, quality assurance, test procedures of new and/or improved methods, troubleshooting, math.

2. Operator Personnel: Seasonal changes that effect biological treatment, refresher courses of basics, activated sludge process (2), safety (practical).

3. Maintenance Personnel: Appreciation and importance of routine preventative maintenance, record keeping, equipment maintenance (2), practical safety.

4. Administrative Personnel: Management course, budget, record keeping, handling personnel problems, general plant knowledge, Yes.

5. Supervisory Personnel: Management course, stay in touch with new laws, procedures, and equipment, handling personnel problems, how to motivate, Yes.

6. Other Training Needs: I feel seminars held by the state help more than exam sessions, sources of funding, dealing with the public.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel in Both Systems

Two "other" job titles/classifications (Q 3.5) were reported as Director of Public Works, and City Clerk and Manager of Utilities.

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Math related to wastewater treatment
- Water and wastewater treatment technician course
- Business administration
- General introductory courses at MATC Apprentice Center
- Enrolled in water-wastewater technician course
- Water and wastewater courses at MATC-Madison
- General water and wastewater courses (6 day)
- Government affairs seminar 2-9-84
- Dale Carnegie course
- Iron removal and zeolite softening
- Correspondence course
- Activated sludge, land application of sludge (2)
- Associate degree in water and wastewater technology (2)
- Management seminars
- Courses on applicable hydraulics, industrial waste treatment, laboratory procedures and maintenance.
- Chemistry
- Well pump maintenance course at Madison

One "other" source of the above training (Q9.4) was Sacramento State College.

The "other" suggestion for learning about training courses (Q 11.9) was former classmates.

Suggestions for orientation/training of elected officials (Q 75) were:

- Seminars directed in showing the importance of a reliable operator to show what is expected of them by DNR, PSC, EPA. Show them the importance of certification. (2)

- At least one member of governing body should be required (by law) to attend general courses to be familiar with operations.

- More understanding of basic operations. Spending some time on the job with the workers. (2)

- If they want the position of running a utility, officials should be made to take a written exam prior to appointment.

For Q 125, the suggestions for orientation/training of elected officials were:

- Seminars explaining the importance of what the operator does and what is expected of him by DNR. (2)

- At least one member of governing body should attend introductory courses. Make it law. (2)

- Something should be done to make it mandatory.

- Water/wastewater newsletter for elected officials.

- An understanding of actual operational problems through practical experience.

"Other" suggestions (Q 76) were:

- Problems are poor budgeting and ignorance of system by elected officials.

- Demonstrations + films, equipment, electricity, troubleshooting, controls.

- More control on credit hours awarded for convention attendance.

For Q 126, the "other" suggestions were:

- Managers, operation directors, executive directors (especially of private operations) should have knowledge of requirements and penalties for mistakes and responsibilities of their certified operators.

- DNR funding for placemnt of students in good on-site summer intern programs in newer wastewater plants.

- Closer control of class hours credited for conventions.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects are included in the sections on Continuing Education/Training needs in water utility and wastewater systems.

Training needs for various categories of personnel indicated by eleven superintentents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: Basic lab, quality assurance, updated lab procedures.

2. Operator Personnel: General plant operation (2), general operation and PM, pump maintenance, troubleshooting, yes.

3. Maintenance Personnel: New ideas in maintenance, pump repairs, electricity, basic maintenance, safety, yes.

4. Administrative Personnel: Educate them on what it takes to operate a treatment plant, budgeting.

5. Supervisory Personnel: How to relate to other employees, employee relations, state and federal laws regarding wastewater.

6. Other Training Needs: In-plant training by state personnel, personal seminars sponsored by state funds, communication is a must for all employees.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

XIII

FINDINGS/RESULTS FOR VTAE DISTRICT LTI - CLEVELAND AREA

Table 60 indicates that 43% of the respondents were employed in wastewater systems only.

Table 60

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status		N	%
Water Utility System only		11	28
Wastewater System only		17	43
Both Water Utility & Wastewater Systems		10	25
Not Working in Either Water Utility or Wastewater		2	5
	TOTAL	40	101

General Findings in Water Utility Systems

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Ground water and distribution
- Milwaukee/DNR surface water short course
- DNR operator training
- ETN sessions
- Groundwater training course

One "Other" source of above training (Q 9.4) was indicated as the University of Cincinnati.

Suggestions for orientation/training of elected officials (Q 75) were:

- They should go to a water treatment plant and see for themselves the problems involved in running and maintaining a plant.
- More use of audio-visual or hands-on lectures.

One "Other" suggestion (Q 76) was that: ETN's should be at least 3, 4, or 6 hours at a sitting to cover the material properly.

Waterworks Certification

The most commonly desired certifications were Iron Removal (I) and Lime Softening (L) each at 16 percent response rate. Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Seventy-four percent (74%) or more of the 19 respondents to Form B desired training in the following subjects/topics: (Rank Order)

- Pumping, Equipment and Controls
- Pumping Equipment Maintenance
- Cold Weather Operations
- Distribution Systems Maintenance
- Unaccounted For Water
- Emergency Operations
- Water Meter Testing

Training needs for various categories of personnel indicated by two water utility superintendents were as follows:

1. Laboratory Technician: Chemical contamination, organic, training is needed.
2. Operator Personnel: Emergency operations, training is needed.
3. Maintenance Personnel: Preventative Maintenance program, training is needed.
4. Administrative Personnel: Management skills.
5. Supervisory Personnel: Management skills.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Quality Assurance (4)
- Lab
- Wastewater sectional meetings
- Wastewater sludge workshop
- ETN classes
- Activated Sludge
- Mechanical Sludge handling
- Presently working towards DNR certification in wastewater field
- Government affairs seminar

"Other" sources of the above training (Q 9.4) were college, UW-Green Bay, UW-Superior and home study and research.

Suggestions for orientation/training of elected officials (Q 125) were:

- Recognize what must be done and work within framework of our constitution so as not to destroy our basic rights.
- Have them visit the facilities.
- One-half (1/2) to one day orientation to operations with slide presentation.

"Other" suggestions (Q 126) were:

- Public officials must be accountable to the electorate. Avoid overlapping of bureaucratic agencies and avoid buck passing. The government has no money except from the taxpayers.

- Superintendents who were "grandfathered" should be updated in training.

- Would like to see a few more courses stressing administrative and management techniques.

- Why must rotating shift operators go on their own time?

- Would like to see some courses directed toward industrial wastewater.

- Testing four times per year and taking less tests.

Wastewater Certification

The most commonly desired certifications were in Grade 4, Primary Settling (A) and Phosphorus (I) each at 26 percent response rate. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Fifty-two percent (52%) or more of the 27 respondents to Form C desired training in the following subjects/topics: (Rank order)

- Corrective Maintenance
- Preventative Maintenance
- Safety
- Confined Area Entry
- Corrective Maintenance
- Wastewater Pumping Equipment
- Lift Station Maintenance/Troubleshooting
- Blower and Aeration Equipment Operation
- Emergency Operation

Training needs for laboratory technicians indicated by one superintendent of a wastewater plant was: Testing for heavy metals.

General Findings from Personnel Working in Both Systems

The "other" job titles/classifications (Q 3.5) was indicated as an Operation Specialist.

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Cold weather operations and pump maintenance
- Operators seminars on ETN
- VTAE advanced activatd sludge - Appleton
- ETN - New products for water works
- Disinfection
- Water and Wastewater - MPTI
- Wastewater treatment course - home study
- Goundwater and surface water training NWTI
- Short course - UW-Madison

"Other" sources indicated for the above training (Q 9.4) were California correspondence course and UW-Madison.

One "other" means of finding out about training courses (Q 11.9) was through mailings.

Suggestions for orientation/training of elected officials (Q 75) were:

- Seminars in evening
- Give understanding of what personnel have to do and why

Under Q 125, the suggestion for orientation/training were:

- Realizing what personnel have to do and why.
- Hold mandatory public relations meeting run by plant supervisor/engineer on basic operation, administration, budgeting.

"Other" suggestions (Q 126) were:

- I have received only one Clarifier in three years. Mailings to the individual operator are important.

- Make sure the instructor of the course knows what information the DNR wants covered and that he presents it during the session.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects are included in the sections on Continuing Education/Training needs in water utility and wastewater systems.

Training needs for various categories of personnel indicated by six superintendents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: To keep certified, training is needed.

2. Operator Personnel: Training to keep certified, Yes.

3. Maintenance Personnel: Training to keep certified, Yes.

4. Other Training Needs: Microcomputers in water/wastewater plants.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

XIV

FINDINGS/RESULTS FOR VTAE DISTRICT FVTI - APPLETON AREA

Table 61 indicates that 54% of the respondents were employed in wastewater systems only.

Table 61

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	17	25
Wastewater System only	37	54
Both Water Utility & Wastewater Systems	11	16
Not Working in Either Water Utility or Wastewater	3	4
TOTAL	68	99

General Findings in Water Utility Systems

Several "other" job titles/classifications (Q 3.5) ere indicated as follows:

- Maintenance supervisor (2)
- Foreman of department
- Foreman
- Chief Operator
- Distribution coordinator

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Chlorine
- UWGB Industrial management
- UWGB Problem solving, decision making
- General
- Water softening course in Columbus
- Recent Degree in business marketing
- Back flow prevention
- DNR, ETN, SEEN sessions
- Industrial supervision
- Management training
- Operator training (3)
- Management/supervision
- BA in Business Management
- Tech Math

The "other" sources for obtaining the above training (Q 9.4) were as follows:

- AWWA annual conference (2)
- A California Junior College
- AWWA ETN (2)
- Outside instructor at our utility
- Milton College

An "other" suggestion for the best way to find out about training courses was to use N.E. Wisconsin Section.

Tours of facilities were suggested by two respondents as a method for orientation/education of elected officials (Q 75).

"Other" suggestions (Q 76) were as follows:

- Good communications between operators and DNR is essential.
- Require supervisors and utility managers to attend classes, especially at AWWA conferences.
- ETN with video is much more interesting.

Waterworks Certification

The most commonly desired certification was in Surface Water (S) (13 percent response). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Fifty-three percent (53%) or more of the 30 respondents to Form C desired training in the following subjects/topics: (In rank order)

- Emergency operations
- Pumping, Equipment and Controls
- Preventative Maintenance
- DNR Requirements for Sampling, Reporting and Operation
- Cross-connection Control
- Management of Plant Operations and Record Keeping

Training needs for various categories of personnel indicated by four water utility superintendents were as follows:

1. Laboratory Technician: Procedures, record keeping, new techniques for lab, monitoring of tests required by DNR.
2. Operator Personnel: Basic operation (2), problem-solving, working with automation.
3. Maintenance Personnel: Basic maintenance, new product lines in treatment, i.e., microprocessor control, etc., training needed.
4. Administrative Personnel: Training needed.
5. Supervisory Personnel: Labor management course, employee relations, training needed.
6. Other Training Needs: Administrative skills, math, science, time management.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were:

- Foreman (3)
- Laboratory/operations manager
- Laboratory supervisor/bacteriologist
- Supervisor/Program Coordinator
- Supervisor
- Utility
- Director of Operations
- Part-time operator - bookkeeper
- Relief operator
- Operator helper

Subject areas of education/training recently received relevant to the job (Q 8) were:

- One (1) day DNR classes at FVTI
- Chemistry, bacteriology
- DNR seminars
- UW short course in wastewater treatment
- Chlorination Nov. '83 MPTI
- Activated sludge (3)
- Advanced activated sludge
- B.S. in chemistry
- Management/Supervision (3)
- Wastewater laboratory quality assurance
- General wastewater (2)
- B.S. in geology
- Post-graduate courses in urban planning
- Wastewater correspondence course
- Maintenance management (2)
- Ponds and lagoons
- Continuing education
- Two-year WW program
- Wastewater technology
- Operator
- Correspondence course
- Prevention and resolution of claims in EPA funded projects
- Lab analysis (4)
- Sludge disposal
- B.S. in water management and biology
- Phosphorus removal
- Mechanical solids handling
- One week short course - 3 times
- Anaerobic digestion

"Other" sources of the above training (Q 9.4) were:

- Four year college (2)
- Sacramento, California correspondence course (2)
- UW-Oshkosh
- University of Illinois, Chicago
- From books
- UW-Stevens Point

Suggestions for orientation/training of elected officials (Q 125) were:

- Tour of facilities (3)
- Spend time with the workers
- Keep them informed so more of their personnel could attend training sessions.
- Need interested people on a committee and plan a course of action. Emphasis must be on improving plant operations and personnel development.
- Show them how help from other plants can benefit operators.
- Awareness of regulations through seminars/workshops (2)

"Other" suggestions (Q 126) were:

- Stop changing forms so often. Some forms don't work on computer, lack of information.

- DNR has done a more complete job of lecturing and orientation than VTAE.

- Night classes better for me because don't have time during day.

- Ease up on higher certification for operator who spends most of his time clearing weeds or hauling sludge.

- Because of my work load, it is almost impossible for me to get away during the day. Day courses are keeping others from training. We need evening courses.

- For large sewerage districts, such as Heart of the Valley Metro district which do not have control over the collection system, in order to maintain a more uniform operation, I believe a certified operator should be in charge of sewerage collection system of cities and villages connected to treatment plant.

- I have to take off without pay. Limit how many off at a time.

- Evening courses would enable more to attend without interfering with work.

- This questionuaire is a beginning approach. The primary concern should be to improve operations with hands-on discussion of plant operations rather than on meeting certification. Evening sessions beneficial for small plants.

- Twelve (12) hours of continuing education is a good idea. However, social activities and training should be kept separate.

- Educate people who grandfathered into certification.

Wastewater Certification

The most commonly desired certification was Grade 4, Disinfection (E) at 25 percent response rate. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Thirty-nine percent (39%) or more of the 51 respondents to Form C desired training in the following subjects/topics:

- Infiltration and Inflow Identification
- Shock Loads and Toxicity Problems
- DNR Requirements for Sampling, Reporting and Operation

Training needs for various categories of personnel indicated by ten superintendents of wastewater plants were as follows:

1. Laboratory Technician: Yes, micro techniques, keeping up with standards, ammonia nitrogen testing, fecal testing, proper testing procedures,

testing beyond the normal, understanding of tests. (2)

2. Operator Personnel: Process control, yes; knowledge of what to do, knowing the plant they operate, why they do it (3), keeping up with new things, safety, conservation and efficiency

3. Maintenance Personnel: Cold weather problems, preventative maintenance practices (2), keeping abreast of new products and equipment, instrumentation and VFD troubleshooting, safety; have a program, clean up after repair; mechanical seal application and maintenance

4. Administrative Personnel: Management practices, understanding their people, keeping up with EPA and DNR literature, proofread what is typed, knowledge of problems and operations, involvement.

5. Supervisory Personnel: Management practices, working with their people (2), keeping up with new things in the field; be on top of things, know all jobs, delegate responsibilities, motivation, conservation and efficiency, budgeting.

6. Other Training Needs: Taking officials through plant to show what workers are doing. Discuss projects with them in the field, budgeting. None if all are certified.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel Working in Both Systems

Subject areas of education/training recently received relevant to the job (Q 8) were reported as follows:

- VTAE classes pertaining to specific areas of our water and wastewater plants
- Operator wastewater treatment and groundwater works
- Water works operations
- Operator certification/continuing education
- DNR short course
- Plumbing
- Backflow certification
- Activated sludge course
- Zeolite softening (2)

Suggestions for orientation/training of elected officials (Q 75) were:

- Explaining costs and time involved and needed to run a water treatment plant and distribution system effectively.

- Understanding basics of operations, cost of running, and laws involved, seminar format.

- Send district engineer into city yearly for pep talk to elected officials.

For Q 125, the suggestions for orientation/training were:

- Elected officials and ruling bodies should be apprised that wastewater treatment plants cost money and require a lot of time to operate effectively to turn out a quality effluent. The smaller villages and towns don't realize this.

- Understanding basic operations, costs, laws, in seminar format.

One "other" suggestion (Q 76) was as follows: The 2 hour to 4 hour ETN sessions aren't worth traveling 30-50 miles to.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects are included in the sections on Continuing Education/Training needs in water utility and wastewater systems.

Training needs for various categories of personnel indicated by three superintendents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: Improving testing skills and new developments in wastewater plant, most critical procedures.
2. Operator Personnel: Second most critical procedures, safety, confined area entry.
3. Maintenance Personnel: Safety, confined area entry.
4. Other Training Needs: Quality control and assurance, math, problem solving (2); orientation of elected officials, time management.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

XV

FINDINGS/RESULTS FOR VTAE DISTRICT NWTI - GREEN BAY AREA

Table 62 indicates that 57% of the respondents were employed in wastewater systems only.

Table 62

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	8	16
Wastewater System only	29	57
Both Water Utility & Wastewater Systems	12	24
Not Working in Either Water Utility or Wastewater	2	4
TOTAL	51	101

General Findings in Water Utility Systems

The "other" job titles/classification (Q 3.5) indicated were: Assistant Superintendent and Laborer.

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Three (3) hours of ETN on-going training
- Supervisory training
- Superintendent conference on management, etc.
- Green Bay
- Auto Mechanic I, just starting basic electronics
- Water works laboratory
- Water training for operator
- Supervision and management

Two "other" sources of above training were: Donaven School and a conference sponsored by MUEW and coops.

An "other" preferred method of delivery (Q74.10) was to bring classroom lectures outside and make them pertinent to on-the-job circumstances.

Suggestions for orientation/training of elected officials (Q 75) were as follows:

- Give them a tour and show what you have to work with and become familiar with some of the concerns rather than just have them talk to engineers or someone who doesn't work with this stuff every day.

- State AWWA should have information program. Each utility handles the local officials.

Waterworks Certification

The most commonly desired certifications were Zeolite Softening (Z), Iron Removal (I) and Lime Softening(L), each at a 15 percent response rate. Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Seventy percent (70%) or more of the 20 respondents to Form B desired training in the following subjects/topics

- Distribution Systems
- Distribution Systems Maintenance
- Pumping Equipment Maintenance
- Preventative Maintenance
- Pumping Equipment and controls
- Leak Detection and Repair
- Cross-Connection Control

Training needs for various categories of personnel indicated by three water utility superintendents were as follows:

1. Laboratory Technicians: Water testing requirements, training is needed.

2. Operator Personnel: DNR requirements for sampling, cross-connection control, chemical feeds, distribution system maintenance, pump, equipment reservoir maintenance, training is needed.

3. Maintenance Personnel: Distribution system maintenance, cold weather operations, pump equipment maintenance, preventative maintenance techniques, problem-solving skills.

4. Administrative Personnel: Supervision of personnel, leadership skills, reporting requirements, records retention, budgeting.

5. Supervisory Personnel: Administrative skills, improving employee/employer realtions, general operations, oral communications.

6. Other Training Needs: Elected officials should be required to be familiar with all departments in their respective municipality.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were indicated as follows:

- Engineering technician
- Quality Control Manager
- Supervisor
- Industrial Environmental Manager
- Chemist-laboratory
- Water Resources Manager
- Corporate director of environmental systems
- Foreman
- Research and Development
- Operations Supervisor
- Shift Supervisor (2)
- Engineer-Manager

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Management/supervision training (2)
- Operator - advanced treatment
- Activated sludge (3)
- Anaerobic digestion (2)
- NWTI
- Operation of wastewater treatment plants Vol. I-III through correspondence with Sacramento State University, California
- Associate of Science in wastewater treatment
- Introduction to wastewater treatment
- B.S. Civil Engineering
- B.S. Chemistry 1979 Viterbo College, minors in math, biology
- Wastewater courses by DNR
- Use of on-line respirometer
- Hydrology
- Advanced ponds (2)
- Supervision (2)
- WWWOC conference in 1982
- Lab and Q/C (2)
- Maintenance management (2)
- Bacterial dissolved oxygen uptake rates in relation to wastewater treatment operation
- Tertiary Filtration
- Engineering

"Other" sources of the above training (Q 9.4) were

- Special seminars
- DNR conference at FVTI
- Sacramento State University Correspondence, California
- Bay de Noc Community College, Escanaba, Michigan
- Marquette University
- Arthur technology seminar
- UW-Green Bay
- City of Menominee
- WWWOC
- Technical consultant seminar
- College

Suggestions for orientation/training of elected officials (Q 125) were:

- Training at the plant needing it, such as small plant with limited availabilities.

- DNR should hold seminars to inform officers of requirements.

- Most need training from ground zero.

- The need to show these people that the pay and responsibilities of an operator or technician should not reflect the pay of the town drunk.

- Public awareness is needed regarding the high quality of wastewater treatment which is possible. This level will not be achieved until governments force municipalities and industries to use the technology available.

- Introduction to why and how wastewater is treated.

- Tour of facilities.

- Enlarge scope of training courses available as in Form C #36-118.

- An evening class in general administration of water/wastewater plants.

- Local officials can push for recognition of people for the job that has been done. Maybe the environmental issues of a decade ago have been partially taken care of due to the good job of wastewater operations.

- There should be interchange between WWOC, AWWA, Wisconsin League of Municipalities, and the Wisconsin Society of Professional Engineers.

"Other" suggestions (Q 126) were:

- Upgrade quality of instructors at DNR courses and VTAE. Too many times we waste a day sitting in class listening to someone with only book experience.

- The workshop hands-on type of training should be increased. Books are fine for principles, but hands-on training is needed for complete instruction.

- More of the courses should involve industrial waste handling not just sewerage treatment.

- Please offer courses for advanced wastewater operator with 4-6 years of experience plus education. (2)

- We need more material to prepare for the advanced (3 & 4) DNR tests.

- Upgrade quality of instructors.

- At the regional WWOC quarterly meetings more than three hours continuing education credits should be earned for the day. Some supervisors think it a waste of time. However, benefits come from meeting with others.

- Evening classes listed in NWTI Night Life booklet with continuing education credit indicated. Employer should pay tuition.

- I think advanced courses for supervisors/superintendents would be good. Also, instructional courses by a person at a plant to point out O & M of different operational systems for visitors and students.

Wastewater Certification

The most commonly desired certification was Grade 4, Laboratory (J) (21 percent response). Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Fifty-two percent (52%) or more of the 42 respondents to Form C desired training in the following subjects/topics:

- Shock Loads and Toxicity Problems
- Cold Weather Operations
- DNR Requirements for Sampling, Reporting and Operation
- Emergency Operations
- Corrective Maintenance

Training needs for various categories of personnel indicated by eight superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Yes, basic bench skill, not only methodology, lab testing for nutrients, see survey, quality control techniques (2).

2. Operator Personnel: Yes (2), knowledge of data interpretation and good sampling, anaerobic digestion processes, see survey, process control/activated sludge, training relative to industrial treatment, better understanding of their importance in achieving goals of program.

3. Maintenance Personnel: Yes (2), basic wastewater knowledge, safety, corrective maintenance/energy conservation (2), innovation in problem-solving.

4. Administrative Personnel: Basic wastewater knowledge, teach accountants to speak English, administrative skills, public relations.

5. Supervisory Personnel: You can never get too much management training, anaerobic digestion, industrial pre-treatment; management of plant operations/record keeping, time management, supervisory/employee relations, motivation.

6. Other Training Needs: Public Relations is essential. (3) Need to find a way to fund training. Most places experiencing tight budgets. All administrative/supervisory personnel need continuous education in administrative skills, budget planning and most of above. The majority of class time should be in the evening. Training is needed for industrial wastewater operations. Budgets, emphasis on importance of wastewater programs to local officials rather than viewed as necessary evils under the Clean Water Act, administrative skills, orientation of public officials.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel Working in Both Systems

Two "other" job titles/classifications (Q 3.5) were indicated as City Engineer and Street Superintendent.

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Wastewater disinfection
- Water and Wastewater basic training (2)
- Teaching - coaching, History major, biology-science minor
- ETN water works operators training seminars
- Cross-connection control program
- Water/wastewater two-year Associate Degree program
- Lift station maintenance

One "other" source of the above training (Q 9.4) was listed as Northern Michigan University.

Suggestions for orientation/training of elected officials (Q 75) were as follows:

- They should attend sessions where the regulations are explained so they would be knowledgeable of the operation.

- Introduction, basic needs, concepts, include with student

- They need to know the problems that are occurring with water works and wastewater plants and the problems that operators have.

- The importance of our operations in night class.

For Q 125, the suggestion for orientation/training of elected officials was: If they have charge of operations, they should be required to understand the regulations and how to comply with them.

"Other" suggestions (Q 76) were:

- Classes should be more enlightening rather than time consuming for time sake.

- Certification classes should be more specific in content.

- It doesn't do any good to mark the water utility subjects or topics for certification because DNR certification board will have last word anyway.

- I would like to know as much as possible about my job so as to better protect the public. I would like to be certified in the rest of waterworks sub-grades. I think this is an excellent piece of material sent out and will help me.

- Flyers on classes could be sent more regularly.

For Q 126, the "other" suggestions were:

- Please have training sessions with enough material to make it worth while for the time spent in attending.

- DNR certification board has last say anyway.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects are included in the sections on Continuing Education/Training needs in water utility and wastewater systems.

Training needs for various categories of personnel indicated by five superintentents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: Changing procedures, new tests, yes.

2. Operator Personnel: Updating on new procedures.

3. Maintenance Personnel: Updating old equipment, most important, yes.

4. Administrative Personnel: How to upgrade treatment plants with limited funds, Get some kind of backing for better wages and benefits for plants under 2,500 population. Train public officials on the responsibilities the operators have in small municipalities.

5. Supervisory Personnel: Using time more efficiently with less personnel.

6. Other Training Needs: Sources of funding, A course on how one might coordinate all the regulatory agencies to accomplish efficient effective operations.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

XVI

FINDINGS/RESULTS FOR VTAE DISTRICT MSTI - WISCONSIN RAPIDS AREA

Table 63 indicates that 35% of the respondents were employed in water utility systems only or in wastewater systems only.

Table 63

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	7	35
Wastewater System only	7	35
Both Water Utility & Wastewater Systems	6	30
Not Working in Either Water Utility or Wastewater	6	30
TOTAL	20	100

General Findings in Water Utility Systems

An "other" job title classification (Q 3.5) was indicated as Relief Operator and Maintenance.

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- First Aid
- Groundwater and distribution
- All the ETN programs
- Basic electricity
- Laboratory

A suggestion for orientation/training of elected officials (Q 75) was: Use the Voc-tech school we have in town (Wisconsin Rapids) instead of traveling to Wausau.

One "other" suggestion (Q 76) was: Get rid of the ETN. It's very boring, generally uninteresting. I learn very little.

Waterworks Certification

The most commonly desired certification was Surface Water (S) (29 percent response). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Sixty-seven percent (67%) or more of the 12 respondents to Form B desired training in the following subjects/topics: (Rank order)

- Pumping Equipment Maintenance
- Preventative Maintenance
- Safety
- Pumping, Equipment and Controls
- Bacterial Contamination/Disinfection
- Unaccounted - For Water
- Improving Employee/Employer Relations

Training needs for various categories of personnel indicated by one water utility superintendent were as follows:

1. Laboratory Technicians: Detection of volatile organics.

2. Operator Personnel: Costs of water.

3. Maintenance Personnel: Chlorine systems, chemical feeds.

4. Other Training Needs: Public relations.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were: Environmental Manager, and Supervisor-Quality Control and Wastewater.

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Secondary treatment
- Civil engineering course, physics
- Sanitary and storm sewers
- General wastewater 1, and 2
- Ponds 1, and 2
- Michigan State University supervisory management course in Wastewater
- Wastewater treatment course (2)

"Other" sources indicated for the above training were: Correspondence and UW-Medford.

A suggestion for orientation/training of elected officials (Q 125) was: My experience has been that they do not attend specific wastewater training sessions, but they attend league of municipality functions. This may be the avenue to reach them.

Wastewater Certification

Grades 2 and 4 were desired in six of the eleven Subgrades at a 23 percent response rate. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Sixty-two percent (62%) or more of the 13 respondents to Form C desired training in the following subjects/topics: (Rank order)

- Preventive Maintenance
- Safety
- Confined Area Study
- Lift Station Maintenance/Troubleshooting
- Flow Management
- Shock Loads and Toxicity Problems
- Cold Weather Operations

Training needs for various categories of personnel indicated by one superintendent of a wastewater plant were as follows:

1. Laboratory Technicians: QA/QC.
2. Operator Personnel: Decision making in emergencies.
3. Maintenance Personnel: Mechanical seals.
4. Administrative Personnel: Computer selection and training.
5. Supervisory Personnel: Effectively working with unions.
6. Other Training Needs: Orientation of elected officials, public relations, problem-solving, parliamentary procedures, communications, inter-personal relations.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel Working in Both Systems

Two "other" job titles/classifications (Q 3.5) were: Relief Operator, and Sewer/Water & Street Commissioner.

Subject areas of education/training recently received relevant to the job (Q 8) were:

- The education necessary to obtain the 1st grade level certification in both wastewater and water operations.
- Lab technician maintenance.
- Physics NCTI.
- WWWOC wastewater conference.

Suggestions for orientation/training of elected officials (Q 75) were:

- Have them attend session on operation of water utility.
- Newsletter!!
- All too often elected officials won't listen unless an outside agency speaks.

For Q 125, the suggestions for orientation/training of elected officials were to invite officials to attend workshops, and to send a newsletter from DNR.

One "other" suggestion (Q 76) was: We could make a lot more classes if they were close by us. For Q 126, the "other" suggestions were: This survey is a good idea that should be done again periodically, and have classes closer by us.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects are included in the sections on Continuing Education/Training for water utility and wastewater systems.

Training needs for various categories of personnel indicated by three superintentents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: Quality control, to make sure testing is done properly.
2. Operator Personnel: To know operator's ability, confined area entry.
3. Maintenance Personnel: Preventative maintenance, to make sure you have a maintenance program.
4. Administrative Personnel: To have people know what's going on, coping with stress.
5. Supervisory Personnel: To have people know what's going on, cold weather operations, trenching, pumping maintenance, cutting valves and service, water distribution, close to home, coping with stress.
6. Other Training Needs: Newsletter on water/wastewater operations to elected officials is needed.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

XVII

FINDINGS/RESULTS FOR VTAE DISTRICT NCTI - WAUSAU AREA

Table 64 indicates that 44% of the respondents were employed in wastewater systems only.

Table 64

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	8	22
Wastewater System only	16	44
Both Water Utility & Wastewater Systems	10	28
Not Working in Either Water Utility or Wastewater	2	6
TOTAL	36	100

General Findings in Water Utility Systems

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Water works lab
- Cross-connection controls
- Water works operator (2)
- Groundwater and distribution training
- Flouride - 6 hours
- AWWA convention different water works subjects.

One "other" source of above training (Q 8) was: AWWA convention.

An "other" suggested way to find out about training sessions (Q 11.9) was by an NCTI flyer.

An "other" preferred method of delivery (Q 74.10) was to use tapes and cassettes.

Suggestions for orientation/training of elected officials (Q 75) were as follows:

- At least 8 hours of classroom training for small utilities to inform of DNR requirements, procedures and PSC procedures and rules by Voc-tech schools.

- More education to keep our license in force, officials will come to know how important our position is.

- Elected officials should be required to tour their facilities at least every year to see for themselves what is going on and what is needed.

An "other" suggestion (Q 76) was to gain higher respect for an operator with more education.

Waterworks Certification

The most commonly desired certification was in Surface Water (S) at a 29 percent response rate. Additional data appear in Appendixex B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Sixty-four percent (64%) of the 14 respondents to Form B desired training in the following subjects: (Rank order)

- Leak Detection and Repair
- Cold Weather Operations
- Emergency Operations
- Preventative Maintenance
- Unaccounted - For Water
- Waterworks Lab Testing

Training needs for various categories of personnel indicated by two water utility superintendents were as follows:

1. Laboratory Technicians: Types of samples, math.
2. Operator Personnel: Minor maintenance, wells.
3. Maintenance Personnel: Electricity, pumps.
4. Administrative Personnel: Computers.
5. Supervisory Personnel: Computers, Groundwater problems.
6. Other Training Needs: At least 8 hours orientation of public officials on DNR and PSC regulations for small sanitary district utilities - Voc-tech Schools.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were: Technician, Technical Director, Maintenance Supervisor, and Technical/Chemical Supervisor.

Subject areas of education/training recently received relevant to the job (Q 8) were indicated as follows:

- Wastewater
- IWT Water training
- B.S. in water chemistry
- UW-Stevens Point (2)
- Biology (2)
- College major in water resource management
- Management training
- State of Wisconsin Training program
- Microbiology
- Hazardous waste training
- Supervision courses
- Groundwater monitoring
- Quality control and confined entry
- Plant operations
- Activated sludge

"Other" sources of the above training (Q 9.4) were:

- Rockford, Ill.
- University of South Florida
- UW-Stevens Point (2)
- UW-Wausau
- J. T. Baker Chemical Company
- NCASI

"Other" best ways for finding out about training sessions (Q 11.9) were indicated as TAPPI and NCASI.

Suggestions for orientation/training of elected officials (Q 125) were indicated as follows:

- Annual tour of facilities
- Annual report to them
- Train mayors to keep out of operations
- Elected officials need a stronger understanding of what it takes to run a plant and a better idea of the costs involved.

"Other" suggestions (Q 126) were reported as follows:

- Your training sessions are becoming too redundant.

- Would like more workshop discussion training and less lecture.

- More emphasis on industrial wastewater treatment needed.

- More courses for industries which deal with inorganic treatment processes. Everything seems to be geared toward P.O.T.W.'s and not industrial treatment systems.

- I am especially interested in advanced level courses in the field of wastewater treatment.

Wastewater Certification

The desired certifications were scattered at a relatively low rate among the various grades and subgrades. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Fifty-two percent (52%) or more of the 21 respondents to Form C desired training in the following subjects:

- Shock Loads and Toxicity Problems
- Odor Control
- Laboratory Quality Assurance
- Flow Measurement

Training needs for various categories of personnel indicated by five superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Water/Wastewater techniques, quality control requirements, shock loading and toxicity problems, industrial monitoring and running toxics, metals, etc.; Quality assurance (2)

2. Operator Personnel: Belt filter operation, advanced activated sludge - industrial, cold weather operations, 3 R's, aerated lagoons, wastewater - spray irrigation, stress common sense and science, safety.

3. Maintenance Personnel: Management of plant operations, record keeping, 3R's, blower maintenance, wastewater pumping equipment corrective/preventive maintenance, maintenance correlated to operations.

4. Administrative Personnel: Computer use, DNR requirements, cost controls.

5. Supervisory Personnel: Computer use, public relations, communication skills, personnel problems.

6. Other Training Needs: More industrial wastewater courses, especially for paper mills; public relations, inter-personal relations, time management, clarification of DNR policies, priorities, biological sciences.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel Working in Both Systems

"Other" job titles/classifications (Q 3.5) were Director of Public Works, Superintendent Operator, and Technician.

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Cold weather operations/pump maintenance
- Management training at NCTI 1981
- B.S. Civil Engineering with post graduation seminars and courses
- Water, VTAE (2)
- Water products
- Water works lab - 1984
- UW Extension courses
- Grades 1, 2, 3 NCTI
- Supervision at American Motors Corporation
- Wastewater - VTAE

"Other" sources of the above training (Q 9.4) were indicated UW-Platteville and other university course, military service, and American Motors, Kenosha.

Suggestions for orientation/training of elected officials (Q 75) were as follows:

- Good communication skills are essential to elected officials. Getting the point across simply and professionally is quite a challenge.

- In keeping with the Wisconsin League of Municipalities, perhaps an explanation of the operator's job responsibilities should be given to them.

Under Q 125, the suggestions for orientation/training of elected officials were:

- Good communicatin skills are essential to elected officials.
- Sending newsletters to elected officials regarding changes.

"Other" suggestions (Q 76) were:

- Updates on Federal, state and local regulations are also essential. We need to keep current. Orientation of new supervisors on regulations. Ongoing orientation.

Under Q 126, the "other" suggestion was: Updates on regulations. Continuous orientation for new and existing supervisors on regulations.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects are included in the sections on Continuing Education/Training needs in water utility and wastewater systems.

Training needs for various categories of personnel indicated by five superintentents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: Certification changes, quality assurance and control, current methodologies, training for small or intermediate size labs, operators keeping up with new methods of testing.

2. Operator Personnel: General, Use of current technology on remote monitoring, process control, operative measures for environmental fluctuations - divisional and seasonal, training for small or intermediate size facilities.

3. Maintenance Personnel: General, Preventative maintenance, current maintenance skills, training for small or intermediate facilities, Yes.

4. Administrative Personnel: Future regulations, changes in pretreatment, communications, regulatory knowledge, rate review and establishment.

5. Supervisory Personnel: Good communication, delegation, fulfilling responsibilities, personnel management.

6. Other Training Needs: Scheduled orientation of officials and administrators and supervisors dealing with regulations should be law, public relations, budgeting (2), source of funding.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

XVIII

FINDINGS/RESULTS FOR VTAE DISTRICT NICOLET - RHINELANDER AREA

Table 65 indicates that 60% of the respondents were employed in both water utility and wastewater systems.

Table 65

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status		N	%
Water Utility System only		—	—
Wastewater System only		3	20
Both Water Utility & Wastewater Systems		9	60
Not Working in Either Water Utility or Wastewater		3	20
	TOTAL	15	100

There are no general findings in water utility systems to report here.

Waterworks Certification

Desired certification was practically non-existent. Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Seventy-five percent (75%) of the eight respondents to Form B desired training in the following subjects: (Rank order)

- Distribution Systems Maintenance
- Wells - Types, Construction, Capacities
- Pumping Equipment Maintenance
- Unaccounted for Water
- Leak Detection and Repair

Training needs for various categories of personnel indicated by one water utility superintendent were as follows:

1. Laboratory Technicians: Training is needed.

2. Operator Personnel: Training is needed.

3. Maintenance Personnel: Training is needed.

4. Other Training Needs: Orientation of elected officials.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) was Plant Manager.

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Control of filamentous bacteria
- Mechanical seals
- Chlorination - disinfection
- Sacramento Courses I, II
- Clemson Class D Course

An "other" source reported for the above training (Q 9.4) was a seal school by Chesterton, Green Bay.

Suggestions for orientation/training of elected officials (Q 125) were reported as follows:

- Elected officials need a better understanding of the reasons for and the requirements of the wastewater industry. Attract them to seminars by addressing money savings and public relations.

- Elected officials should be educated.

"Other" suggestions (Q 126) were as follows:

- DNR workshops and seminars are more useful because of the specificity of the subject matter. Some of the Voc-tech courses seem repetitive.

- The best schools I've ever attended were DNR schools.

Wastewater Certification

From one-fourth to one-third of the twelve respondents desired certification at Grade 2 in all subgrades. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Fifty percent (50%) or more of the 12 respondents desired training in the following subjects: (Rank order)

- Cold Weather Operations
- Corrective Maintenance
- Preventative Maintenance
- Characteristics of Wastewater
- Wastewater Pumping Equipment
- Sludge Pumping Equipment

Training needs for various categories of personnel indicated by three superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Basic chemistry, lab testing for nutrients, more lab studies.

2. Operator Personnel: Biology, chemistry, physics, class in filamentous bacteria.

3. Maintenance Personnel: Power trains, bearing troubleshooting, motors and lubrication, yes.

4. Administrative Personnel: Computers and their applications, costs of repairs, requirements of your operation.

5. Supervisory Personnel: Computers and their applications.

6. Other Training Needs: Inform elected officials of what takes place in the departments and that machines wear out and need to be replaced.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel Working in Both Systems

Two "other" job titles/classifications (Q 3.5) were Maintenance Mechanic 3, and Management.

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Woods superintendent
- Laboratory (2)
- W.P.C.F. Government affairs seminars
- ETN - liability 1-83 Rhinelander

"Other" sources of the above training (Q9.4) were W.P.C.F., WWWCC, and on-the-job training.

A suggestion for orientation/training of elected officials (Q 75) was more advanced classes needed.

"Other" suggestions (Q 76) were microbiology and lab equipment. Under Q 126, the "other" suggestions were troubleshooting and more advanced classes - so much to be learned.

Continuing Education/Training Desired by Personnel in Both Systems

Specific topics of continuing education and training desired are included in the sections on continuing education/training for water utility and wastewater systems. Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

XIX

FINDINGS/RESULTS FOR VTAE DISTRICT WITI - SHELL LAKE AREA

Table 66 indicates that 37% of the repondents were employed in wastewater systems only or in both water utility and wastewater systems.

Table 66

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	11	19
Wastewater System only	22	37
Both Water Utility & Wastewater Systems	22	37
Not Working in Either Water Utility or Wastewater	4	7
TOTAL	59	100

General Findings in Water Utility Systems

One "other" job titles/classification (Q 3.5) was that of Maintenance Foreman.

Subject areas of education/training recently received relevant to the job (Q 8) were as follows:

- Municipal water treatment
- Cold water operations Jan. 17, 1984
- Operator certification courses - ETN Network
- Flouridation seminar at Rice Lake
- ETN Water works seminars for continuing operator credits for recertification
- Distribution system maintenance
- B.S. - UC Davis
- Mechanical Seals
- Business administration
- Equipment maintenance
- Groundwater and distribution

"Other" sources of above training (Q 9.4) were USAFI and Sun Test Equipment.

Waterworks Certification

The most commonly desired certification was for Iron Removal (I) (15 percent response). Additional data appear in Appendixes B, D, and M.

Continuing Education/Training Desired in Water Utility Subjects

Forty-five percent (45%) or more of the 33 respondents to Form B desired training in the following subjects: (Rank order)

-Pumping Equipment Maintenance
-Water Meter Maintenance and Repair
-Bacterial Contamination/Disinfection
-Unaccounted - For Water
-Cold Weather Operations
-Leak Detection and Repair

Training needs for various categories of personnel indicated by two water utility superintendents were as follows:

1. Operator Personnel: Lab procedures, training needed.

2. Maintenance Personnel: Maintenance, equipment safety.

Refer to Table 20 and Appendixes B and F for additional rankings and response rates to desired training.

General Findings in Wastewater Systems

"Other" job titles/classifications (Q 3.5) were reported as: Plumbing Inspector, Chemist-Operator, and Chemical Engineer (Management).

Subject areas of education/training recently received relevant to the job (Q 8) were indicated as follows:

- Confined entry procedures
- Secondary treatment - activated sludge
- Ponds
- Laboratory
- Activated sludge (2)
- Quality Assurance
- Supervisory management (3)
- Wastewater conferences (4)
- Bio-Bact
- DNR O & M
- Facilities maintenance management
- Continuing education - required hours
- Hazardous materials and substances
- Waste training and compliance seminar
- Associate Degree in Water/Wastewater technology
- Chemistry lab
- General introduction - VTAE
- General anaerobic digesters

"Other" sources reported for the above training (Q 9.4) were: Wisconsin Safety Council, Mt. Scenario College, Ladysmith, Wisconsin wastewater works operators conference, UW-Superior, University of Illinois, Air Force Technical Schools, Mt. Telemark and Transportation Skills Program, Inc., Kutzlawn, PA.

An "other" suggested way for finding out about training sessions (Q 11.9) was through the Northwest Ripplings.

Suggestions for orientation/training of elected officials (Q 125) were reported as follows:

- Training tours could be done.

- Make attendance mandatory to a conference which addresses the importance of proper treatment of wastewater, the operator, collection systems, maintenance, permits, budget.

- Annual or semi-annual conference or workshop by DNR.

- Invite them to conferences and training seminars to gain understanding and convince them of the need for training.

- Invite officials to meetings, plants, classes to gain understanding.

- Get local people excited about your plant, then local officials might get excited. Let them know you are excited about your plant. Show them your certification papers and other class papers. Have local paper take pictures while elected officials are visiting plant.

- Make them aware of how important the work and responsibilities are.

"Other" suggestions (Q 126) were:

- The city of Superior does not inform us or send us to training sessions.

- Instructors should be equipped to certify students the number of hours taken on the day classes are held.

Wastewater Certification

The most commonly desired certification was Grade 4 in Activated Sludge (C) at 17 percent response rate. Additional data appear in Appendixes C, D, and N.

Continuing Education/Training Desired in Wastewater Subjects

Forty percent (40%) or more of the 47 respondents to Form C desired training in the following subjects: (Rank order)

- Cold Weather Operations
- Infiltration and Inflow Identification
- Flow Measurement
- Odor Control

Training needs for various categories of personnel indicated by six superintendents of wastewater plants were as follows:

1. Laboratory Technicians: Keeping current with requirements; quality control (2); update of procedures, proper use of equipment, acquire good attitude, currently conducting our training while on the job, BOD, SS, nutrient testing.

2. Operator Personnel: Gaining better comprehension of total process, trickling filter operation, control in cold weather, proper maintenance - acquire good attitude, hydraulic principles, general training at Voc-tech, on-the-job training, activated sludge process control.

3. Maintenance Personnel: Appreciating the significance of plant failures due to less than conscientious work, need guidance on how to produce O & M manual, understanding of operations, acquire good attitude; PM (2); have a separate maintenance department for the plant.

4. Administrative Personnel: Reducing operating costs - short term and long term, understand people and plant, acquire good attitude; budgeting and scheduling (2). Training by plant personnel department.

5. Supervisory Personnel: Training for advancement of those being supervised, understand people and plant, acquire good attitude, DNR requirements, training by personnel department, record keeping.

6. Other Training Needs: Due to the industrial aspect I deal with, the public needs to know of the good job being done to protect the environment. Much of the time we're pictured as the "bad" guys who are out to see how much pollution we can spread; supervisory skills training; develop pride in work, general knowledge of plant operations.

Refer to Table 27 and Appendixes C and H for additional rankings and response rates to desired training.

General Findings from Personnel Working in Both Systems

One "other" job titles/classifications (Q 3.5) indicated was Chairman - Sanitary District.

Subject areas of education/training recently received relevant to the job (Q 8) were:

- Management course at Rice Lake, WITI
- Accounting
- Trained for activated sludge
- Chemical addition
- Water and sewer certification at Voc-tech (3)
- 12 hours of sewer every 2 years
- 12 hours of water every 2 years
- Groundwater distribution and wastewater - General for DNR certification (2)
- Water works course at VTAE Eau Claire
- Water and wastewater technical school - Neosha, MO. 9 months course
- Water April '83, wastewater general and subs VTAE 1981
- Introduction to wastewater treatment
- Ponds - 3 days UW-Extension, Medford

One "other" source of the above training (Q 9.4) was a technical school in Neosha, Missouri.

Suggestions for orientation/training of elected officials (Q 75) were a DNR mandate, and doing a good job. Under Q 125, the suggestions were:

- Our officials usually come with us (to training sessions) - just ask them, you'd be surprised.

- Inform them of changing regulations, confined entry, plant modernization.

- Some ETN sessions.

"Other" suggestions (Q 76) were: Please offer training at Superior Voc-tech and keep up the good work. Under Q 126, the "other" suggestions were:

- All operators should attend their council, town, or commission meeting. That is the place to suggest improvements. Operators keep the commissioners involved. Promote the idea we are all responsible to our customers.

Continuing Education/Training Desired by Personnel in Both Systems

Responses to specific subjects are included in the sections on Continuing

Education/Training under water utility and wastewater systems.

Training needs for various categories of personnel indicated by nine superintendents of both water utility and wastewater plants were as follows:

1. Laboratory Technicians: Basic daily skills useful on a day-to-day basis, coliform bacteria training, Yes, lab certification.

2. Operator Personnel: Plant economics, all training - new man; Yes (4); operation and principles of aerated lagoons, maintenance; process control (2); new plant operations.

3. Maintenance Personnel: Plant economics, all training - new man; Yes (4); preventative maintenance (2); electrical troubleshooting, new plant operations.

4. Administrative Personnel: Computer skills, public relations, budget.

5. Supervisory Personnel: Plant economics, computer skills, public relations; personnel relations.

6. Other Training Needs: All of the above, better understanding of objectivity, sources of funding, public relations, ETN sessions for elected officials.

Refer to Tables 20 and 27 and Appendixes D, F and H for additional rankings and response rates to desired training.

FINDINGS/RESULTS BY DNR DISTRICTS

XX

FINDINGS RESULTS FOR DNR DISTRICT ONE - SOUTHERN DISTRICT

Table 67 indicates that 25% of the 200 respondents in DNR District One work in water utility systems only.

Table 67

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	50	25
Wastewater System only	68	34
Both Water Utility & Wastewater Systems	69	35
Not Working in Either Water Utility or Wastewater	13	7
TOTAL	200	101

The general findings for DNR District One would be very similar to those included under the general findings reported for VTAE Districts, 3 (SWTI), 4 (MATC-Mdsn), 5 (BTI) and 10 (MPTI) with the major exceptions of Crawford and Washington counties.

Waterworks Certification

The most commonly desired certification was Iron Removal (I) with a 22 percent response rate. Additional data appear in Appendixes B, D, and O.

Continuing Education/Training Desired in Water Utility Subjects

Fifty-four percent (54%) or more of the 118 respondents to Form B desired training in the following subjects: (In rank order)

- Preventative Maintenance
- Leak Detection and Repair
- Pumping Equipment Maintenance
- Pumping Equipment and Controls
- Distribution Systems Maintenance

Refer to Table 20 and Appendixes B and G for additional rankings and response rates to desired training.

Wastewater Certification

The most commonly desired certifications were Grade 4, Disinfection (E) and Laboratory (J) with response rates of 25 percent and 24 percent respectively. Additional data appear in Appendixes C, D, and P.

Continuing Education/Training Desired in Wastewater Subjects

Forty-six percent (46%) or more of the 137 respondents to Form C desired training in the following subjects: (In rank order)

- Cold Weather Operations
- Preventative Maintenance
- Infiltration & Inflow Identification
- Lift Station Maintenance/Troubleshooting
- Flow Measurement
- Blower & Aeration Equipment Operation
- Shock Loads & Toxicity Problems
- Corrective Maintenance

Refer to Table 27 and Appendixes C and I for additional rankings and response rates to desired training.

Continuing education and training desired by personnel working in both water utility and wastewater systems are included in the above sections on continuing education/training. Refer to Tables 20 and 27 and Appendixes D, G and I for additional rankings and rates of responses to desired training. Training needs for various categories of personnel indicated by plant superintendents are listed under the VTAE districts encompassed by DNR District One.

XXI

FINDINGS/RESULTS FOR DNR DISTRICT TWO -SOUTHEAST DISTRICT

Table 68 indicates that 43% of the 168 respondents in DNR District Two work in wastewater systems only.

Table 68

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% is based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	66	39
Wastewater System only	73	43
Both Water Utility & Wastewater Systems	20	12
Not Working in Either Water Utility or Wastewater	9	5
TOTAL	168	99

The general findings for DNR District Two would be very similar to the general findings reported for VTAE Districts 6 (GTI), 8 (WCTI) and 9 (MATC-Milw) with the major additionss of Sheboygan County (LTI) and Washington county (MPTI).

Waterworks Certification

The most commonly desired certification was Surface Water (S) with a response rate of 18 percent. Additional data appear in Appendixes B, D, and O.

Continuing Education/Training Desired in Water Utility Subjects

Sixty percent (60%) or more of the 84 respondents to Form B desired training in the following subjects: (Rank order)

- Preventative Maintenance
- Leak Detection and Repair
- Distribution Systems Maintenance
- Emergency Operations
- Pumping Equipment Maintenance
- Unaccounted For Water
- Cold Weather Operations

Refer to Table 20 and Appendixes B and G for additional rankings and response rates to desired training.

Wastewater Certification

The most commonly desired certifications were Grade 4, Activated Sludge (C) and Disinfection (E) with response rates of 30 percent and 29 percent respectively. Additional data appear in Appendixes C, D, and P.

Continuing Education/Training Desired in Wastewater Subjects

Forty-two percent (42%) or more of the 97 respondents to Form C desired training in the following subjects: (Rank order)

- Preventative Maintenance
- Shock Loads & Toxicity Problems
- Cold Weather Operations
- Corrective Maintenance
- Management of Plant Operations & Record Keeping
- Leadership Skills
- Written Communications
- Problem-Solving Skills
- Oral Communications
- Improving Employee/Employer Relations
- Supervision of Personnel

Refer to Table 27 and Appendixes C and I for additional rankings and response rates to desired training.

Continuing education and training desired by personnel working in both water utility and wastewater systems are included in the above sections on continuing education training. Refer to Tables 20 and 27 and Appendixes D, G and I for additional rankings and response rates to desired training.

Training needs for various categories of personnel indicated by plant superintendents are listed under VTAE districts encompassed by DNR District Two.

XXII

FINDINGS/RESULTS FOR DNR DISTRICT FOUR - LAKE MICHIGAN DISTRICT

Table 69 indicates that 53% of the 140 respondents in the Lake Michigan District work in wastewater systems only.

Table 69

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% is based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	32	23
Wastewater System only	74	53
Both Water Utility & Wastewater Systems	29	21
Not Working in Either Water Utility or Wastewater	5	4
TOTAL	140	101

The general findings for DNR District Four are very similar to the general findings reported for VTAE Districts 11 (LTI), 12 (FVTI), and 13 (NWTI) with the major additions of Menominee and western Shawano Counties (NCTI) and the major exception of Sheboygan county (LTI).

Waterworks Certification

The most commonly desired certifications were Iron Removal (I) and Surface Water (S) with response rates of 11 percent and 10 percent respectively. Additional data appear in Appendixes B, D, and O.

Continuing Education/Training Desired in Water Utility Subjects

Sixty-two percent (62%) or more of the 61 respondents to Form B desired training in the following subjects:

- Pumping Equipment and Controls
- Pumping Equipment Maintenance
- Preventative Maintenance
- Emergency Operations
- Distribution System Maintenance
- Distribution Systems
- Cross-Connection Control

Refer to Table 27 and Appendixes C and I for additional rankings and response rates to desired training.

Wastewater Certification

The most commonly desired certifications were Grade 4, Disinfection (E) and Laboratory (J) with response rates of 21 percent and 20 percent respectively. Additional data appear in Appendixes C, D, and P.

Continuing Education/Training Desired in Wastewater Subjects

Forty-nine percent (49%) or more of the 107 respondents to Form C desired training in the following subjects: (Rank order)

- Electricity
- Supervision of Personnel
- Shock Loads & Toxicity Problems
- Oral Communication
- Electronics
- Written Communication
- Leadership Skills
- Administrative Skills
- Problem-Solving Skills

Continuing education and training desired by personnel working in both water utility and wastewater systems are included in the above sections on continuing education/training. Refer to Table 20 and 27 and Appendixes D, G, and I for additional rankings and response rates to desired training.

Training needs indicated by plant superintendents for various categories of personnel are listed under the findings for the VTAE districts encompassed by DNR District Four.

XXIII

FINDINGS/RESULTS FOR DNR DISTRICT SIX - WEST CENTRAL DISTRICT

Table 70 indicates that 47% of the 87 respondents in the DNR West Central District work in both water utility and wastewater systems.

Table 70

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% is based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	9	10
Wastewater System only	34	39
Both Water Utility & Wastewater Systems	41	47
Not Working in Either Water Utility or Wastewater	3	3
TOTAL	87	99

The general findings for DNR District 6 are very similar to the general findings included for VTAE Districts One (Eau Claire) and 2 (WWTI) with additional responses from Crawford (SWTI), St. Croix (WITI) and part of Clark (NCTI) (MSTI) counties; and the major exception being Juneau (WWTI) County.

Waterworks Certification

The most commonly desired certifications were Iron Removal (I) and Surface Water (S) each with a 13 percent response rate. Additional data appear in Appendixes B, D, and O.

Continuing Education/Training Desired in Water Utility Subjects

Fifty-two percent (52%) or more of the 48 respondents to Form B desired training in the following subjects: (Rank order)

- Distribution Systems
- Pumping Equipment and Controls
- Chemical Addition, Type, Safety, Amounts, Troubleshooting
- Leak Detection and Repair
- Unaccounted - For Water
- Preventative Maintenance
- Reservoir Maintenance
- Distribution System Maintenance
- Pumping Equipment Maintenance
- Cross-Connection Control

Refer to Table 20 and Appendixes B and G for additional rankings and rates of responses to desired training.

Wastewater Certification

The most commonly desired certification was Grade 2, Laboratory (J) with 11 percent response rate. Additional data appear in Appendixes C, D, and P.

Continuing Education/Training Desired in Wastewater Subjects

Forty-four percent (44%) or more of the 72 respondents to Form C desired training in the following subjects:

- Cold Weather Operations
- Flow Measurements
- Blower & Aeration Equipment Operation
- Wastewater Pumping Equipment
- Lift Station Maintenance/Troubleshooting
- Preventative Maintenance
- Shock Load & Toxicity Problems
- Sludge Hauling & Land Application
- Emergency Operations

Refer to Table 27 and Appendixes C and I for additional rankings and response rates to desired training.

Continuing education and training desired by personnel working in both water utility and wastewater systems are included in the above sections on continuing education/training. Refer to Table 20 and 27 and Appendixes D, G and I for additional rankings and response rates to desired training.

Training needs indicated by plant superintendents for various categories of personnel are listed under the findings for the VTAE districts encompassed by DNR District Six.

XXIV

FINDINGS/RESULTS FOR DNR DISTRICT SEVEN - NORTH CENTRAL DISTRICT

Table 71 indicates that only 3% of the 66 respondents in the DNR North Central District indicated they were not working in either water utility or wastewater systems.

Table 71

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)

(% is based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	16	24
Wastewater System only	25	38
Both Water Utility & Wastewater Systems	23	35
Not Working in Either Water Utility or Wastewater	2	3
TOTAL	66	100

The general findings for DNR District Seven are very similar to the general findings indicated for VTAE districts 14 (MSTI), 15 (NCTI), and 16 (Nicolet) with the major exceptions of Price, southern Iron, eastern Taylor, eastern Clark, western Shawano, and Menominee Counties. The major addition would be Juneau County of WWTI VTAE district.

Waterworks Certifcation

The most commonly desired certification was Surface Water (S) with a 21 percent respose rate. Additional data appear in Appendixes B, D, and O.

Continuing Education/Training Desired in Water Utility Subjects

Fifty-six percent (56%) or more of the 34 respondents to Form B desired training in the following subjects: (Rank order)

- Leak Detection and Repair
- Preventative Maintenance
- Pumping Equipment Maintenance
- Unaccounted - For Water
- Pumping Equipment and Controls
- Cold Weather Operations
- Safety
- Distribution Systems
- Emergency Operations
- Water Meter Maintenance and Repair

Refer to Table 20 and Appendixes B and G for additional rankings and response rates to desired training.

Wastewater Certification

The most commonly desired certifications were Grade 2, General Introduction and Stabilization Ponds/Aerated Lagoons (D), and Grade 4, Activated Sludge (C), all with a 14 percent response rate. Additional data appear in Appendixes C, D, and P.

Continuing Education/Training Desired in Wastewater Subjects

Forty-five percent (45%) or more of the 42 respondents to Form C desired training in the following subjects/topics: (Rank order)

- Shock Loads & Toxicity Problems
- Cold Weather Operations
- Flow Measurement
- Laboratory Quality Assurance
- Odor Control
- Preventative Maintenance
- Wastewater Pumping Equipment
- Sludge Hauling & Land Application
- Corrective Maintenance

Refer to Table 27 and Appendixes C and I for additional rankings and response rates to desired training.

Continuing education and training desired by personnel working in both water utility and wastewater systems are included in the above sections on continuing education/training. Refer to Tables 20 and 27 and Appendixes D, G and I for additional rankings and response rates to desired training.

Training needs indicated by plant superintendents for various categories of personnel are listed under the findings for the VTAE districts encompassed by DNR District Seven.

XXV

FINDINGS/RESULTS FOR DNR DISTRICT EIGHT - NORTHWEST DISTRICT

Table 72 indicates that 39% of the 57 respondents in the DNR Northwest District worked in wastewater systems only.

Table 72

NUMBER (N) & PERCENT (%) OF RESPONDENTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)
(% is based on N and does not always total 100 due to rounding)

Employment/Work Status	N	%
Water Utility System only	10	18
Wastewater System only	22	39
Both Water Utility & Wastewater Systems	20	35
Not Working in Either Water Utility or Wastewater	5	9
TOTAL	57	101

The general findings for DNR District Eight are very similar to the general findings reported for VTAE District 17 (WITI) with the major exception of most of St. Croix county, and including Taylor (District One and NCTI), Price (NCTI), and southern Iron (Nicolet) Counties.

Waterworks Certification

The most commonly desired certification was Iron Removal (I) with a 17 percent response rate. Additional data appear in Appendixes B, D, and O.

Continuing Education/Training Desired in Water Utility Subjects

Forty percent (40%) of the 30 respondents to Form B desired training in the following subjects: (Rank order)

- Water Meter Maintenance and Repair
- Unaccounted - For Water
- Cold Weather Operation
- Leak Detection and Repair
- Water Meters Testing
- Preventative Maintenance
- Distribution Systems
- Pumping Equipment Maintenance
- Cutting-in Valves and Service

Refer to Table 20 and Appendixes B and G for additional rankings and response rates to desired training.

Wastewater Certification

The most commonly desired certification was Grade 4, Activated Sludge (C) with an 18 percent response rate. Additional data appear in Appendixes C, D, and P.

Continuing Education/Training Desired in Wastewater Subjects

Forty percent (40%) or more of the 45 respondents to Form C desired training in the following subjects: (Rank order)

- Infiltration & Inflow Identification
- Cold Weather Operations
- Odor Control
- Administrative Skills
- Flow Measurement
- Mathematical Process Control Calculation
- Emergency Operations
- Supervision of Personnel
- Leadership Skills
- Oral Communications

Refer to Table 27 and Appendixes C and I for additional rankings and response rates to desired training.

Continuing education and training desired by personnel working in both water utility and wastewater systems are included in the above sections on continuing education/training. Refer to Tables 20 and 27 and Appendixes D, G and I for additional rankings and response rates to desired training.

Training needs indicated by plant superintendents for various categories of personnel are listed under the findings for the VTAE districts encompassed by DNr District Eight.

There were five (5) respondents from outside the state of Wisconsin for which no data is analyzed separately.

XXVI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A jointly sponsored survey was conducted during January and February of 1984 to ascertain the continuing education/training needs of personnel working in water utility and wastewater systems in Wisconsin. Of the estimated 4,000 mailings, 723 (18%) completed questionnaires were processed for this report.

Conclusions

Conclusions about the respondents, water utilities and wastewater systems in general include the following:

1. Nearly half (41%) of the respondents worked in wastewater systems only, while about one-fourth worked in water utility systems only (25%) and in both water utility and wastewater systems (28%). Five percent reported they were not working in either system.
2. Slightly over half of the respondents who were working in the systems reported their job title/classification as "operator."
3. Nearly three-fourths of the personnel working in water utility systems only and in wastewater systems only, worked 35 hours or more per week.
4. Less than half (46%) of the personnel working in both/combined systems worked 35 hours or more per week.
5. From a half to two-thirds of the personnel had been employed in municipal systems between 2-14 years.
6. Nearly half (46%) of the water utility personnel had been employed 15 years or more.
7. Personnel working in both/combined systems reported at the highest rate (63%) for completing high school Grade 12.
8. Personnel in wastewater systems reported at the highest rate (35%) for completing post high school at grade 16-17 or more.
9. Over 90% of all respondents had completed high school Grade 12 or higher.
10. Most of the respondents had taken at least one course relevant to their job, and over half had taken it within the last two years.
11. The best ways to find out about training courses were through VTAE announcements and DNR Certified Operator.
12. The twelve hours of continuing education required every two years for recertification was endorsed as "about right" by about 80% of the respondents.
13. "Combined" water utility/wastewater systems tended to have fewer employees than the discrete water utility and wastewater systems. The

median sizes of water utility plants ranged from 1 to 13 full-time personnel. The median wastewater plants ranged from 1 part-time to 70 full-time personnel, while the median for "combination" systems ranged from 1 to 5 part-time employees.

14. There were over twice as many superintendents of wastewater systems (85) and superintendents of "combined" systems (85) responding than superintendents of water utilities (36) responding.

Conclusions relative to objective one (training needs) include the following:

15. Technical subjects were the most frequently desired to improve operations, while general subjects were the most commonly desired for personal development.

16. The most highly desired training in water utility subjects was in the areas of preventative maintenance, leak detection and repair, emergency and cold weather operations, water meter testing, safety, and electricity by over 50% of the personnel working either in water utility systems only or in both systems. The reason for desiring the above training was to improve operations.

17. The most highly desired training in wastewater subjects was in the areas of preventative maintenance, cold weather operations, flow measurement, equipment, inflow identification, shock loads and toxicity problems by 50% of the personnel working in wastewater systems only or in both systems. The reason for desiring this training was to improve operations.

18. The most common topics desired for personal development were electricity/electronics, problem-solving skills, oral and written communications, supervision of personnel, and leadership skills by 40-50% of the respondents.

19. Superintendents of water utilities indicated top training needs for various categories of personnel as sampling techniques, preventative maintenance, safety, employee/employer relations, DNR requirements, and orientation of elected officials.

20. Superintendents of wastewater systems indicated top training needs for various categories of personnel as quality assurance, safety, preventative maintenance, budget preparation, employee relations, and orientation of elected officials.

21. Superintendents of both/combined systems indicated top training needs were basic lab testing procedures, certification training, preventative maintenance, budget preparation, leadership skills and orientation of elected officials.

22. In DNR Lake Michigan District, the water utility personnel desired training in Item #16 DNR Requirements for Sampling, Reporting and Operation at a noticeably higher rate (56%) than in other DNR districts.

23. In DNR Southern, West Central, and North Central Districts, the

wastewater subjects desired for training the most, was Item #89, Cold Weather Operations, which was at a higher rate (55% or more) than in the other DNR districts.

24. In DNR Southeast District, water utility subjects desired for training the most, was Item #49, Preventative Maintenance. The most desired wastewater subject was also Preventative Maintenance.

25. In DNR Northwest District, water utility subjects desired for training the most, was Item #42, Water Meter Maintenance and Repair. The most desired wastewater subject was Item #46, Infiltration and Infow Identification.

26. The use of microcomputers in water utility and wastewater systems ranked in the top 20 among some reporting groups and some VTAE districts.

27. The least desired water utility subject was lime softening systems, and the least desired wastewater subject was trenching.

Conclusions relative to objective two (certification/subgrades) include the following:

28. Certification ranked relatively low as a reason for desiring training.

29. Current certifications in waterworks subgrades were relatively high for Groundwater (G) and Distribution (D) among personnel working in "water utility systems only" and "both water utility and wastewater systems," but 15 percent or less of the respondents desired certification in any one of the six subgrades.

30. Current certifications in wastewater grades and subgrades were relatively equally distributed at a relatively low rate throughout the four grades and eleven subgrades among personnel working in "wastewater systems only" and "both wastewater and water utility systems," and 25 percent or less desired certification in any one of the four grades or eleven subgrades.

Conclusions relative to objective three (delivery methods) include the following:

31. Respondents want hands-on training by experienced personnel close to home.

32. The most common suggestions for orientation/training of elected officials were tours of facilities, talking to the workers, making presentations at their meetings, and encouraging them to gain understanding of the operations and familiarization with governmental regulations.

Recommendations

Because of the changing technological advancements in water/wastewater systems; the differences in training, experience and qualifications of personnel; and the variety of conditions and demands for these systems throughout the state; further identification of specific training and certification needs may be necessary. This document can be used as a resource by individuals and advisory committees during the delineation of specific needs, establishment of priorities, and the development of plans to meet these needs and priorities in their respective areas of responsibilities. They should analyze the data and,

Relative to objective one (conclusions 15-27):

1. Plan and conduct the training most desired and needed.

2. Assess the implications for using microcomputers/computers in water utility and wastewater systems and implement training in their expanding applications.

Relative to objective 2 (conclusions 28-30):

3. Evaluate disparities between current and desired subgrade certifications of water utility and wastewater personnel and implement needed training in the various job classifications.

Relative to objective three (conclusions 31-32):

4. Customize training content and delivery methods to better meet the needs of personnel working in systems of various sizes.

5. Schedule training sessions at different locations to facilitate the participants' learning from a variety of systems.

6. Use experienced instructors and "hands-on" methods of instruction wherever possible.

7. Explore the development of a statewide orientation and training package for elected officials.

8. Review the supply and qualifications of trainers and provide/develop necessary professional development opportunities for them.

9. Report to higher echelons in the respective agencies or organizations if unable to conduct training/education needed.

APPENDIX A

State of Wisconsin \ **DEPARTMENT OF NATURAL RESOURCES**

Carroll D. Besadny
Secretary

BOX 7921
MADISON, WISCONSIN 53707

Dear Operator: January 1984

The Wastewater/Waterworks treatment profession is constantly changing and becoming more complex. That is why training must be specific enough to give attention to detail, yet varied enough to provide something for everyone.

In cooperation with the Wisconsin Wastewater Works Operator's Conference, Inc. (WWWOC), the American Water Works Association (AWWA), UW-Stout, UW-Extension, and the Wisconsin Board of Vocational, Technical and Adult Education (WBVTAE), we are conducting a survey of training needs for water utility and wastewater personnel.

The purpose of the survey is to find out what types of training are needed in your field, and use this information for planning and conducting the necessary training.

The attached questionnaire is in four parts: (1) Form A, General Information, to be completed by everyone receiving the questionnaire, (2) Form B, Water Utility, to be completed by those working primarily in Water Utility systems, (3) Form C, Wastewater to be completed by those working primarily in Wastewater systems, and (4) Form D, Plant Superintendent to be used by Plant Superintendents in what they feel are the most critical training needs for personnel they supervise. Only one completed Form D is required from a water utility plant and a wastewater plant.

We would appreciate you taking the time to fill out the appropriate part(s) of this questionnaire. Your response will be treated confidentially, and the data will be used to help plan training sessions to meet your individual needs, as well as the overall state operational needs. Summaries of findings will be published in the WWWOC Clarifier, AWWA Water Log, and DNR Certified Operator. The summary of results will also be sent to all survey participants.

Please return the completed questionnaire(s) to your Plant Superintendent or mail it within one week. All completed questionnaires must be sent to Roland Krogstad, Research Consultant, Wisconsin Board of Vocational, Technical and Adult Education, 4802 Sheboygan Avenue - 7th Floor, P.O. Box 7874, Madison, WI 53707.

We feel this survey is extremely important. Please take the time now to help make it your training program.

Sincerely,
Division of Environmental Standards

Thomas P. Mickelson

Thomas P. Mickelson, Coordinator
Operator Certification and Training

TBM:man/2784U

APPENDIX B

STATE TOTAL NUMBER(N) AND PERCENT(%) OF RESPONSES FROM WATER UTILITY PERSONNEL(Q 2.1)

Grand Total State N=723, Water Utility N=183, (25%) Ch=Checks (responses), % based on N, not on checks.

-Questionnaire-

Form A
General Information
~~ALL PERSONNEL~~
COMPLETE

TRAINING NEEDS ASSESSMENT - WATER UTILITY/WASTEWATER PERSONNEL

1. County ____________________
(To assist in planning and conduct of training sessions only)

2. Indicate your present employment/work status:

Ch(N) %
183 25 1. Work in Water Utility system only.
____ 2. Work in Wastewater system only.
____ 3. Work in both Water Utility and Wastewater systems.
____ 4. Not working in either Water Utility or Wastewater systems.

3. Check your job title or job classification(225 Checks, 2 omits)

Ch %
49 27 1. superintendent
6 3 2. laboratory technician
97 53 3. operator
28 15 4. maintenance
43 23 5. other (specify) ____________________

4. Check the total number of hours you work at above job(s) per week.(183 checks, 0 omits)

Ch % 29 - 16 1. 10 hrs. or less   Ch % 25 - 14 2. 11-34 hrs.   Ch % 129 · 70 3. 35 hrs. or more

5. Check number of years you have been employed in municipal water utilities and/or wastewater systems. (183 checks, 2 omits)

Ch % 6 - 3 1. less than 2 years   91 - 50 2. 2-14 years   84 - 46 3. 15 years or more

6. Circle the highest grade or year of school completed. (183 checks, 4 omits)

Elementary					High School				Post High School				
4	5	6	7	8	9	10	11	12	13	14	15	16	17+
6 - 3					6 - 3		3 - 2	97 - 53	12 - 7	19 - 10	7 - 4	15 - 8	14 - 8

7. Check the following subjects/courses you have had during or after high school.(1849 checks, 37 omits)

Ch %
61 - 33 1. Physics
97 - 53 4. Biology
93 - 51 2. Chemistry
29 - 16 5. Bacteriology
65 - 36 3. Management/Supervision
41 - 22 6. Engineering

8. Name the study area of your most recent formalized education or training received relevant to your job indicated in questionnaire item #3 (Job Title or Job Classification) above. Do not count routine on-the-job training/orientation. (141 - 77 checks, 42 - 23 omits)

See Report

9. Where did you receive the above training?(209 checks, 20 omits)

Ch %
73 - 40 1. Voc-Tech School (VTAE)
36 - 20 2. UW Extension
36 - 20 3. DNR Conference
44 - 24 4. Other (specify) ____________________

10. How long ago did you receive the above training?(187 checks, 21 omits)

Ch %
101 - 55 1. currently enrolled or within last 2 years
26 - 14 2. 2-5 years ago   39 - 21 3. over 5 years ago

11. What is the best way(s) for you to find out about training courses available?(373 checks, 3 omits)

Ch %
101 - 55 1. DNR Certified Operator
6 - 3 2. WWOC # Clarifier
49 - 27 3. AWWA Water Log
97 - 53 4. Voc-Tech (VTAE) Announcements
23 - 13 5. UW-Extension Building
37 - 20 6. DNR Operator/Instructor
36 - 20 7. Your Supervisor
8 - 4 8. From workers in plant
13 - 7 9. Other (specify) ____________________

12. Do you think 12 hours of continuing education every two years for recertification is:(183 ch, 2 omits)

Ch % 9 - 5 1. Too much   29 - 15 2. Not enough   144 - 79 3. About right

NOTE: This questionnaire is being sent to both Water Utility and Wastewater personnel. If you work in the Water Utility only, complete Form B. If you work in Wastewater only, complete Form C. If you work in both, please complete both Forms B and C. Both Plant Superintendents in Water Utility and in Wastewater should each complete Form D if they have one or more employees under their supervision.

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Form B
Water Utility

-Questionnaire-

WATER UTILITY PERSONNEL

13. Please indicate the number of people employed in your Water Utility system.

NA 1. Full Time   NA 2. Part Time

14- 15. Below are listed the DNR Certification Subgrades for waterworks personnel. In Column "A" please check (✓) the subgrades in which you are currently certified. In Column "B" please check (✓) those in which you would like to become certified within the next 18 months.

Waterworks Subgrades	14. Column "A" Already Certified (N=179 Ch=484 6 OMITS)		15. Column "B" Would Like Certification (N=179 Ch=226 126 OMITS)	
	Ch - %		Ch - %	
G. Groundwater	155 - 87	1	9 - 5	1
D. Distribution	143 - 80	2	13 - 7	2
Z. Zeolite Softening	45 - 25	3	15 - [illegible]	3
I. Iron Removal	52 - 29	4	26 - 15	4
L. Lime Softening	37 - 21	5	15 - 8	5
S. Surface Water	46 - 26	6	22 - 12	6

16- 67. Below are listed additional specific subjects/topics for which you may or may not desire training within the next three years for three possible reasons, such as: (1) for certification, (2) to improve plant operations/efficiency, or (3) for personal knowledge, upgrading and development. Please check (✓) your one most important reason for desiring the training. Check column (4) if training is not desired.

(N=179)

Water Utility Subjects/Topics		Reasons for Desiring Training (1) For Certification	(2) Improve Operations	(3) Personal Development	(4) Do Not Desire	
		Ch - %	Ch - %	Ch - %	Ch - %	Total Ch
16. DNR Requirements for Sampling, Reporting and Operation	28-16 OMITS	28 - 16	71 - 40	32 - 18	23 - 13	182
17. Certification Rules	31-17 OMITS	40 - 22	24 - 13	39 - 22	49 - 27	183
18. Safety	21-12 OMITS	9 - 5	93 - 52	37 - 21	23 - 13	183
19. Properties of well water	27-15 OMITS	15 - 9	52 - 29	45 - 25	42 - 23	181
20. Reservoir maintenance	27-15 OMITS	10 - 6	90 - 50	27 - 15	27 - 15	181
21. Hydrologic cycle, movement of groundwater	30-17	13 - 7	29 - 16	52 - 29	56 - 31	180
22. Distribution systems	17-9 OMITS	23 - 13	94 - 53	35 - 20	20 - 11	189
23. Distribution systems maintenance	20-11 OMITS	16 - 9	93 - 52	41 - 23	17 - 9	187
24. Wells - types, construction, capacities	26-15	10 - 10	41 - 23	59 - 33	37 - 21	181
25. Pumping, equipment and controls	18-10 OMITS	12 - 7	96 - 54	45 - 25	14 - 8	185
26. Pumping equipment maintenance	22-12 OMITS	13 - 7	97 - 54	42 - 23	11 - 6	185
27. Bacterial contamination/disinfection	30-17	24 - 13	76 - 42	36 - 20	18 - 10	184
28. Chemical Addition, type safety, amounts, troubleshooting	28-16 OMITS	18 - 10	87 - 49	32 - 18	21 - 12	186
29. Surface water treatment	36-20 OMITS	19 - 11	33 - 18	23 - 13	72 - 40	183
30. Unaccounted-for water	22-12 OMITS	9 - 5	98 - 55	30 - 17	31 - 17	190
31. Cold weather operations	27-15 OMITS	12 - 7	96 - 54	30 - 17	23 - 13	188
32. Leak detection and repair	21-12 OMITS	14 - 8	98 - 55	30 - 17	24 - 13	188
33. Emergency operations	23-13 OMITS	15 - 8	104 - 58	32 - 18	13 - 7	187
34. Trenching	31-17 OMITS	5 - 3	58 - 32	32 - 18	56 - 31	182
35. Well abandonment	31-17 OMITS	9 - 5	40 - 22	42 - 23	57 - 32	179
36. Waterworks lab testing	31-17 OMITS	20 - 11	60 - 34	53 - 30	22 - 12	186
37. Lime softening systems	35-20 OMITS	17 - 9	16 - 9	27 - 15	87 - 49	182
38. Iron removal systems	28-16 OMITS	24 - 13	26 - 15	35 - 20	69 - 39	182
39. Zeolite softening systems	32-18 OMITS	17 - 9	22 - 12	33 - 18	80 - 45	184
40. Chemical contamination	25-14 OMITS	21 - 12	71 - 40	40 - 22	29 - 16	186
41. Water meters testing	26-15 OMITS	13 - 7	80 - 45	38 - 21	35 - 20	192
42. Water meter maintenance and repair	20-11	11 - 6	81 - 45	37 - 21	39 - 22	188
43. Cutting in valves and services	26-15 OMITS	13 - 8	68 - 38	44 - 25	37 - 21	190
44. Cross-connection control	23-13 OMITS	23 - 13	83 - 46	42 - 23	20 - 11	191
45. Public Service Commission Regulations	26-15	17 - 9	64 - 36	56 - 31	25 - 14	188
46. Energy Conservation	34-19 OMITS	2 - 1	74 - 41	42 - 23	30 - 17	182
47. Use of micro-computers in waterworks operations	30-17 OMITS	5 - 3	59 - 33	41 - 23	50 - 28	185
48. Management of plant operations and recordkeeping	25-14 OMITS	6 - 3	77 - 43	56 - 31	23 - 13	187
49. Preventative maintenance	23-13 OMITS	8 - 4	112 - 63	43 - 24	11 - 6	197
50. Building and ground maintenance	32-18 OMITS	4 - 2	78 - 44	38 - 21	36 - 20	188
51. Contract services	34-19 OMITS	3 - 2	50 - 28	34 - 19	63 - 35	184
52. Arithmetic	34-19 OMITS	9 - 5	30 - 17	56 - 31	59 - 33	188

Form B (con't)
Water Utility

Water Utility Subjects/Topics	OMITS	(1) For Certification Ch - %	(2) Improve Operations Ch - %	(3) Personal Development Ch - %	(4) Do Not Desire Ch - %	TOTAL CHECKS
		Reasons for Desiring Training				
53. Algebra	43-24	5 - 3	11 - 6	51 - 28	69 - 39	179
54. Basic Chemistry	40-22	9 - 5	26 - 15	57 - 32	52 - 29	184
55. Electronics	40-22	4 - 2	31 - 17	72 - 40	34 - 19	181
56. Electricity	40-22	5 - 3	36 - 20	77 - 43	25 - 14	183
57. Fluid Hydraulics	41-23	5 - 3	31 - 17	64 - 36	40 - 22	181
58. Public Relations	40-22	7 - 4	48 - 27	57 - 32	35 - 20	187
59. Budgeting	42-23	2 - 1	54 - 30	39 - 22	47 - 26	184
60. Supervision of personnel	37-21	4 - 2	53 - 30	57 - 32	36 - 20	187
61. Leadership skills	37-21	3 - 2	48 - 27	68 - 38	31 - 17	187
62. Administrative skills	39-22	3 - 2	49 - 27	61 - 34	34 - 19	186
63. Oral communication	39-22	4 - 2	36 - 20	71 - 40	34 - 19	184
64. Written communication	41-23	4 - 2	37 - 21	69 - 39	34 - 19	185
65. Improving employee/employer relations	35-20	7 - 4	63 - 35	53 - 30	29 - 16	187
66. Time management	41-23	3 - 2	50 - 28	45 - 25	46 - 26	185
67. Problem-solving skills	38-21	5 - 3	46 - 26	73 - 41	22 - 12	184
68. Other (specify) ______	158-88	1 - 1	1 - 1	1 - 1	18 - 10	179

69-72. Please indicate when you would prefer taking your training, and the nature of preferred sessions. (Consider preferred days of the week, time of day, length of session, and season.)

(N=179)
69. Preferred Day of Week (14 OMITS 242 Checks)

Ch - %	
61 - 34	1. No preference
22 - 12	2. Monday
54 - 30	3. Tuesday
60 - 34	4. Wednesday
56 - 31	5. Thursday
16 - 9	6. Friday
5 - 3	7. Saturday
4 - 2	8. Sunday

(N=179)
70. Preferred Time of Day (13 OMITS 193 Checks)

Ch - %	
42 - 23	1. No preference
18 - 10	2. Forenoon only
55 - 31	3. Afternoon only
8 - 4	4. Evening only
51 - 29	5. All day only
4 - 2	6. All day & evening
NA	7. Other ______

(N=179)
71. Preferred Length of Sessions (13 OMITS 207 Checks)

Ch - %	
30 - 17	1. No preference
64 - 36	2. Half-day session
55 - 31	3. One-day session
22 - 12	4. Two-day session
10 - 6	5. Three-day session
4 - 2	6. Week-long session
4 - 2	7. Other ______

(N=179)
72. Preferred Season (17 OMITS 244 Checks)

Ch - %	
62 - 35	1. Spring
12 - 7	2. Summer
55 - 31	3. Fall
98 - 55	4. Winter

73-74. Please indicate by whom and how you would prefer taking your training. Consider such agencies as Voc-Tech., UW Extension, American Water Works Association, etc. Consider methods of delivery, such as, Conferences, workshops, class lectures, Cable TV, ETN (Educational Telephone Network), etc.

(N=179)
73. Preferred Agency (14 OMITS 276 Checks)

Ch - %	
49 - 27	1. No preference
66 - 37	2. Voc-Tech (VTAE)
42 - 23	3. UW Extension
46 - 26	4. DNR
8 - 4	5. Private Consultants
46 - 26	6. AWWA
1 - 1	7. WWWOC
1 - 1	8. WPCF (Wis. Chapter Water Pollution Control Federation)
3 - 2	9. Other (specify) ______

(N=179)
74. Preferred Methods of Delivery (14 OMITS 379 Checks)

Ch - %	
20 - 11	1. No preference
28 - 16	2. On-the-job training
70 - 39	3. Classroom lectures
37 - 21	4. Laboratory experiences
85 - 47	5. Workshops/Seminars
34 - 19	6. Conferences
30 - 17	7. Cable TV/Educ. TV
13 - 7	8. Video tapes/correspondence
48 - 27	9. Educ. Telephone Network (ETN)
NA	10. Other (specify) ______

75. Please indicate any suggestions you have for orientation or training of elected officials. What is needed? How could it be done?

See Report

76. Any other suggestions or comments? (Attach additional sheets if necessary)

See Report

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APPENDIX C

STATE TOTAL NUMBER(N) AND PERCENT(%) OF RESPONSES FROM PERSONNEL WORKING IN WASTEWATER ONLY (Q 2.2) (Grand Total State N=723, Wastewater N=298 (41%)
Ch=Checks (responses), % based on N, not on checks

Form A
General Information
~~ALL PERSONNEL~~
COMPLETE

TRAINING NEEDS ASSESSMENT - WATER UTILITY/WASTEWATER PERSONNEL

1. County ____________________
(To assist in planning and conduct of training sessions only)

2. Indicate your present employment/work status:

N %
____ 1. Work in Water Utility system only.
298-41 2. Work in Wastewater system only.
____ 3. Work in both Water Utility and Wastewater systems.
____ 4. Not working in either Water Utility or Wastewater systems.

3. Check your job title or job classification (404 checks, 1 OMIT)

Ch %
82-28 1. superintendent
49-16 2. laboratory technician
152-51 3. operator
46-15 4. maintenance
74-25 5. other (specify) ____________________

4. Check the total number of hours you work at above job(s) per week. (298 checks, 1 OMIT)

Ch % 38-13 1. 10 hrs. or less Ch % 44-15 2. 11-34 hrs. Ch % 215-72 3. 35 hrs. or more

5. Check number of years you have been employed in municipal water utilities and/or wastewater systems. (298 checks, 3 OMITS)

Ch % 24-8 1. less than 2 years Ch % 205-69 2. 2-14 years Ch % 66-22 3. 15 years or more

6. Circle the highest grade or year of school completed. (298 checks, 3 OMITS)

Elementary	High School			Post High School				
4 5 6 7 8	9 10	11	12	13	14	15	16	17+
5-2	9-3	1-0	98-33	16-5	47-16	13-4	75-25	31-10

7. Check the following subjects/courses you have had during or after high school. (869 checks, 27 OMITS)

Ch % 142-48 1. Physics Ch % 202-68 2. Chemistry Ch % 133-45 3. Management/Supervision
210-70 4. Biology 87-29 5. Bacteriology 68-23 6. Engineering

8. Name the study area of your most recent formalized education or training received relevant to your job indicated in questionnaire item #3 (Job Title or Job Classification) above. Do not count routine on-the-job training/orientation.
(257 checks, 41 OMITS) See report

9. Where did you receive the above training? (344 checks, 19 OMITS)

Ch %
161-54 1. Voc-Tech School (VTAE)
48-16 2. UW Extension
31-10 3. DNR Conference
85-29 4. Other (specify) See Report

10. How long ago did you receive the above training? (303 checks, 22 OMITS)

Ch %
161-54 1. currently enrolled or within last 2 years
70-23 2. 2-5 years ago 50-17 3. over 5 years ago

11. What is the best way(s) for you to find out about training courses available? (597 checks, 7 OMITS)

Ch %
132-44 1. DNR Certified Operator
120-40 2. WWOC # Clarifier
7-2 3. AWWA Water Log
193-65 4. Voc-Tech (VTAE) Announcements

Ch %
18-6 5. UW-Extension Building
56-19 6. DNR Operator/Instructor
36-12 7. Your Supervisor
15-5 8. From workers in plant
13-4 9. Other (specify) See Report

12. Do you think 12 hours of continuing education every two years for recertification is: (298 checks, 3 OMITS)

Ch % 22-7 1. Too much Ch % 47-16 2. Not enough Ch % 226-76 3. About right

NOTE: This questionnaire is being sent to both Water Utility and Wastewater personnel. If you work in the Water Utility only, complete Form B. If you work in Wastewater only, complete Form C. If you work in both, please complete both Forms B and C. Both Plant Superintendents in Water Utility and in Wastewater should each complete Form D if they have one or more employees under their supervision.

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Form C
Wastewater

-Questionnaire-

WASTEWATER PERSONNEL

13. Please indicate the number of people employed in your Wastewater system.

NA 1. Full Time NA 2. Part Time

14-35. Below are listed the DNR Certification Grades and Subgrades for Wastewater personnel. In Columns "a" (1-4) please circle the grade levels of the subclasses in which you are currently certified. In Columns "b" (1-4) please circle those grade levels for the subclasses for which you desire to become certified.

Wastewater Sub-Grades	OMITS	Certification Grades (a) N=301 Current Certification ch % 1	2	3	4	(b) N=301 Desired Certification ch % 1	2	3	4	OMITS
14-15. — General Introduction	275-91	5-2	9-3	7-2	8-3	7-2	23-8	20-7	59-20	206-68
16-17. A. Primary Settling	68-23	67-22	65-22	50-17	99-33	5-2	13-4	25-8	61-20	213-71
18-19. B. Trickling Filter & RBC	117-39	55-18	40-13	40-13	75-25	6-2	11-4	13-4	49-16	233-77
20-21. C. Activated Sludge	78-26	70-23	59-20	49-16	86-29	7-2	21-7	25-8	69-23	194-64
22-23. D. Stabilization Ponds/Aerated Lagoon	128-43	59-20	41-14	27-9	58-19	12-4	19-6	22-7	44-15	222-74
24-25. E. Disinfection	93-31	61-20	51-17	47-16	87-29	8-3	16-5	23-8	69-23	198-66
26-27. F. Anaerobic Digestion	122-41	47-16	43-14	36-12	77-26	8-3	9-3	23-8	63-21	216-72
28-29. G. Mechanical Sludge Handling (not including hauling & application	117-39	51-17	30-10	40-13	81-27	10-3	16-5	21-7	60-20	218-72
30-31. H. Effluent Filtration	151-50	41-14	30-10	25-8	67-22	7-2	8-3	14-5	45-15	238-79
32-33. I. Phosphorus	145-48	43-14	33-11	29-10	70-23	9-3	11-4	15-5	53-18	233-77
34-35. J. Laboratory	67-22	70-23	63-21	53-18	96-32	10-3	26-9	26-9	69-23	189-63

36-119. Below are listed additional specific subjects/topics for which you may or may not desire training within the next three years for three possible reasons, such as: (1) for certification, (2) to improve plant operations/efficiency, or (3) for personal knowledge, upgrading and development. Please check (✓) your one most important reason for desiring the training. Check column (4) if training is not desired.

(N = 301)

Wastewater Subjects/Topics	OMITS	Reasons for Desiring Training (1) For Certification ch %	(2) Improve Operations ch %	(3) Personal Development ch %	(4) Do Not Desire ch %	Total Checks
36. DNR requirements for sampling, reporting and operation.	26-9	52-17	103-34	82-27	52-17	313
37. Certification rules.	37-12	74-25	29-10	77-26	91-30	309
38. Characteristics of wastewater.	34-11	33-11	105-35	73-24	68-23	313
39. Safety	34-11	22-7	109-36	106-35	46-15	317
40. Confined area entry.	47-16	11-4	79-26	80-27	88-29	305
41. Wastewater pumping equipment	29-10	26-9	116-39	81-27	56-19	309
42. Collection systems	43-14	16-5	75-25	72-24	98-33	304
43. Collection system maintenance.	35-12	17-6	88-29	64-21	105-35	309
44. Collection systems water hydraulics.	42-14	11-4	55-18	87-29	110-37	305
45. Plant water hydraulics	46-15	7-2	74-25	93-31	85-28	305
46. Infiltration & inflow identification	41-14	9-3	121-40	65-22	74-25	310
47. Lift station maintenance/troubleshooting	35-12	14-5	99-33	75-25	89-30	312
48. Flow measurement	34-11	25-8	125-42	82-27	46-15	312
49. Electrical equipment and instrumentation	33-11	11-4	111-37	109-36	50-17	314
50. Industrial monitoring.	39-13	14-5	112-37	70-23	76-25	311
51. Industrial pretreatment.	40-13	11-4	105-35	84-28	70-23	310
52. Shock loads & toxicity problems.	34-11	14-5	152-50	65-22	48-16	313
53. Primary settling treatment process	40-13	42-14	86-29	49-16	92-31	309
54. Sludge pumping equipment	41-14	20-7	93-31	74-25	76-25	304
55. Sludge pumping procedures.	46-15	25-8	92-31	53-18	86-29	302
56. Mathematical process control calculations.	[illegible]-13	35-12	77-26	90-30	71-24	312
57. Microscopic examination of organisms	40-13	22-7	88-29	94-31	69-23	313
58. Trickling filter process	48-16	24-8	33-11	41-14	159-53	305
59. Rotating biological contactor process.	47-16	27-9	36-12	55-18	142-47	307
60. Nitrogen control	37-12	20-7	101-34	73-24	81-27	312
61. Activated sludge basics.	42-14	40-13	69-23	67-22	96-32	314
62. Activated sludge process control	43-14	32-11	103-34	66-22	69-23	313
63. Oxidation ditches.	47-16	10-3	26-9	52-17	172-57	307
64. Package plants	45-15	7-2	29-10	65-22	159-53	305
65. Activated sludge modes of operation.	40-13	37-12	84-28	77-26	74-25	312
66. Blower and aeration equipment operation.	37-12	20-7	110-37	79-26	66-22	312

APPENDIX C (continued)

Form C (con't)
Wastewater

Wastewater Subjects/Topics	OMITS	Reasons for Desiring Training (1) For Certification Ch %	(2) Improve Operations Ch %	(3) Personal Development Ch %	(4) Do Not Desire Ch %	Total Checks
67. Stabilization pond operation	40-13	29 - 10	40 - 13	53 - 18	148 - 49	310
68. Aerated lagoon process	42-14	22 - 7	43 - 14	54 - 18	146 - 49	307
69. Seepage lagoon	47-16	13 - 4	28 - 9	48 - 16	167 - 55	303
70. Spray irrigation of wastewater	49-16	8 - 3	22 - 7	71 - 24	154 - 51	304
71. Chlorine disinfection	36-12	55 - 18	89 - 30	65 - 22	72 - 24	317
72. Ultraviolet light disinfection	46-15	14 - 5	30 - 10	121 - 40	95 - 32	306
73. Fixed-cover anaerobic digestion	46-15	24 - 8	43 - 14	63 - 21	129 - 43	305
74. Floating-cover anaerobic digestion	46-15	30 - 10	55 - 18	60 - 20	113 - 37	304
75. Digester gas production and use	46-15	24 - 8	66 - 22	68 - 23	102 - 34	306
76. Sludge conditioning	43-14	35 - 12	87 - 29	65 - 22	82 - 27	312
77. Sludge thickening/dewatering	40-13	33 - 11	96 - 32	71 - 24	72 - 24	312
78. Sludge hauling and land application	41-14	42 - 14	114 - 38	65 - 22	56 - 19	318
79. Aerobic digestion	43-14	31 - 10	58 - 19	63 - 21	114 - 38	309
80. Phosphorus removal	47-16	34 - 11	58 - 19	61 - 20	111 - 37	311
81. Laboratory testing for BOD and suspended solids	39-13	47 - 16	91 - 30	76 - 25	66 - 22	319
82. Lab testing for nutrients	45-15	26 - 9	76 - 25	82 - 27	82 - 27	311
83. Fecal coliform and chlorine testing	39-13	39 - 13	81 - 27	77 - 26	82 - 27	318
84. Dissolved oxygen control & determinations	40-13	36 - 12	104 - 35	73 - 24	62 - 21	315
85. Laboratory quality assurance	36-12	36 - 12	114 - 38	73 - 24	53 - 18	312
86. Laboratory instrumentation	35-12	33 - 11	101 - 34	81 - 27	63 - 21	313
87. Sampling for process control	50-17	26 - 9	111 - 37	58 - 19	65 - 22	310
88. Chemical addition	43-14	29 - 10	91 - 30	71 - 24	75 - 25	309
89. Cold weather operations	36-12	15 - 5	144 - 48	62 - 21	54 - 18	311
90. Odor control	40-13	14 - 5	123 - 41	62 - 21	71 - 24	310
91. Emergency operations	47-16	17 - 6	124 - 41	71 - 24	49 - 16	308
92. Physical/Chemical treatment	50-17	21 - 7	77 - 26	67 - 22	88 - 29	303
93. Trenching	53-18	6 - 2	17 - 6	44 - 15	184 - 61	304
94. Corrective maintenance	41-14	11 - 4	120 - 40	76 - 25	64 - 21	312
95. Preventive maintenance	39-13	11 - 4	132 - 44	75 - 25	55 - 18	312
96. Energy conservation	47-16	6 - 2	109 - 36	85 - 28	60 - 20	307
97. Contract services	53-18	4 - 1	46 - 15	69 - 23	131 - 44	303
98. Use of microcomputers in wastewater operations	47-16	6 - 2	79 - 26	107 - 36	69 - 23	308
99. Management of plant operations and recordkeeping	39-13	13 - 4	104 - 35	101 - 34	51 - 17	308
100. Building and ground maintenance	51-17	6 - 2	66 - 22	59 - 20	121 - 40	303
101. Arithmetic	47-16	15 - 5	23 - 8	61 - 20	156 - 52	302
102. Algebra	46-15	11 - 4	24 - 8	74 - 25	149 - 50	304
103. Basic Chemistry	46-15	17 - 6	42 - 14	82 - 27	119 - 40	306
104. Electronics	43-14	9 - 3	44 - 15	128 - 43	84 - 28	308
105. Electricity	42-14	9 - 3	49 - 16	134 - 45	71 - 24	305
106. Fluid hydraulics	47-16	9 - 3	44 - 15	108 - 36	98 - 33	306
107. Public Relations	47-16	7 - 2	51 - 17	111 - 37	92 - 31	308
108. Budget Preparation	46-15	6 - 2	49 - 16	92 - 31	113 - 38	306
119. Supervision of personnel	37-12	8 - 3	50 - 17	134 - 45	80 - 27	309
110. Leadership skills	41-14	6 - 2	43 - 14	133 - 44	83 - 28	305
111. Administrative skills	44-15	6 - 2	41 - 14	126 - 42	89 - 30	306
112. Oral communication	44-15	6 - 2	36 - 12	128 - 43	92 - 31	306
113. Written communication	46-15	5 - 2	40 - 13	127 - 42	86 - 29	304
114. Improving employee/employer relations	41-14	6 - 2	59 - 20	123 - 41	81 - 27	310
115. Time management	45-15	4 - 1	46 - 15	106 - 35	104 - 35	305
116. Problem-solving skills	47-16	7 - 2	43 - 14	128 - 43	81 - 27	306
117. Other (specify) ______	289-96	2 - 1	3 - 1	3 - 1	5 - 2	302
118. Other (specify) ______	291-97	2 - 1	2 - 1	4 - 1	5 - 2	304

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Form C (con't)
Wastewater

119- Please indicate when, you would prefer taking your training and the nature of preferred sessions.
122. (Consider preferred days of the week, time of day, length of session, and season.)

(N = 301)
119. Preferred Day of Week (ch = 540 OMIT = 26)

ch %
47-32 1. No preference
54-18 2. Monday
102-34 3. Tuesday
114-38 4. Wednesday
101-34 5. Thursday
42-14 6. Friday
3-1 7. Saturday
1-0 8. Sunday

(N = 301)
120. Preferred Time of Day (ch = 328 OMIT = 23)

ch %
67-22 1. No preference
28-9 2. Forenoon only
28-9 3. Afternoon only
31-10 4. Evening only
140-47 5. All day only
9-3 6. All day & evening
2-1 7. Other ______

(N = 301)
121. Preferred Length of Sessions (ch = 345 OMIT = 23)

ch %
56-19 1. No preference
50-17 2. Half-day session
106-35 3. One-day session
61-20 4. Two-day session
29-10 5. Three-day session
12-4 6. Week-long session
8-3 7. Other ______

(N = 301)
122. Preferred Season (ch = 424 OMIT = 40)

ch %
99-33 1. Spring
47-16 2. Summer
96-32 3. Fall
142-47 4. Winter

123- Please indicate by whom and how you would prefer taking your training. Consider such agencies
124. as Voc-Tech schools, UW Extension, DNR, Wisconsin Wastewater Works Operators Conference, Inc., etc. Consider methods of delivery, such as, conferences, workshops, class lectures, Cable TV, ETN (Educational Telephone Network), etc.

(N = 301)
123. Preferred Agency (ch = 485 OMIT = 20)

ch %
83-28 1. No preference
136-45 2. Voc-Tech (VTAE)
61-20 3. UW-Extension
87-29 4. DNR
26-9 5. Private Consultants
3-1 6. AWWA
51-17 7. WWWOC
13-4 8. WPCF (Wis. Chapter Water Pollution Control Federation)
5-2 9. Other (specify) ______

(N = 301)
124. Preferred Methods of Delivery (ch = 656 OMIT = 21)

ch %
38-13 1. No preference
73-24 2. On-the-job training
145-48 3. Classroom lectures
80-27 4. Laboratory experiences
159-53 5. Workshops/Seminars
71-24 6. Conferences
30-10 7. Cable TV/Educ. TV
22-7 8. Video tape/correspondence
17-6 9. Educ. Telephone Network (ETN)
NA 10. Other (specify) ______

125. Please indicate any suggestions you have for orientation or training of elected officials. What is needed? How could it be done?
See Report

126. Any other suggestions or comments? (Attach additional sheets if necessary)
See Report

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APPENDIX D

STATE TOTAL NUMBER(N) AND PERCENT(%) OF RESPONSES FROM PERSONNEL WORKING IN BOTH WATER UTILITY AND WASTEWATER (Q 2.3)

(State grand total N=723, Both water utility/wastewater N=203(28%); Ch=Checks (responses); % based on N-not checks

Form A
General Information
~~ALL PERSONNEL~~
COMPLETE

TRAINING NEEDS ASSESSMENT - WATER UTILITY/WASTEWATER PERSONNEL

1. County ______________________
(To assist in planning and conduct of training sessions only)

2. Indicate your present employment/work status:

N %
____ 1. Work in Water Utility system only.
____ 2. Work in Wastewater system only.
203-28 3. Work in both Water Utility and Wastewater systems.
____ 4. Not working in either Water Utility or Wastewater systems.

3. Check your job title or job classification (325 checks 0 OMITS)

ch %
99-48 1. superintendent
30-15 2. laboratory technician
116-57 3. operator
52-26 4. maintenance
29-14 5. other (specify) see Report

4. Check the total number of hours you work at above job(s) per week. (203 checks 1 OMIT)

ch % 37-15 1. 10 hrs. or less ch % 71-35 2. 11-34 hrs. ch % 94-46 3. 35 hrs. or more

5. Check number of years you have been employed in municipal water utilities and/or wastewater systems. (203 checks, 1 OMIT)

ch % 16-8 1. less than 2 years ch % 134-66 2. 2-14 years ch % 52-26 3. 15 years or more

6. Circle the highest grade or year of school completed. (203 checks, 0 OMITS)

Elementary	High School			Post High School				
4 5 6 7 8	9 10	11	12	13	14	15	16	17+
9 ch - 4 %	4 ch - 2 %	3-1	127-63	13-6	21-10	4-2	8-4	14-7

7. Check the following subjects/courses you have had during or after high school. (442 checks, 33 OMITS)

ch % 67-33 1. Physics ch % 96-47 2. Chemistry ch % 57-28 3. Management/Supervision
110-54 4. Biology 28-14 5. Bacteriology 31-15 6. Engineering

8. Name the study area of your most recent formalized education or training received relevant to your job indicated in questionnaire item #3 (Job Title or Job Classification) above. Do not count routine on-the-job training/orientation.
203 checks, 43 OMITS, 160 (79%) responses, see report

9. Where did you receive the above training? (245 checks, 24 OMITS)

ch %
120-59 1. Voc-Tech School (VTAE)
30-15 2. UW Extension
41-20 3. DNR Conference
30-15 4. Other (specify) ______________________

10. How long ago did you receive the above training? (210 checks, 30 OMITS)

ch %
101-50 1. currently enrolled or within last 2 years
42-21 2. 2-5 years ago 37-18 3. over 5 years ago

11. What is the best way(s) for you to find out about training courses available? (422 checks, 9 OMITS)

ch %
87-43 1. DNR Certified Operator
62-31 2. WWOC # Clarifier
34-17 3. AWWA Water Log
145-71 4. Voc-Tech (VTAE) Announcements

ch %
21-10 5. UW-Extension Building
50-25 6. DNR Operator/Instructor
5-2 7. Your Supervisor
2-1 8. From workers in plant
7-3 9. Other (specify) ______________________

12. Do you think 12 hours of continuing education every two years for recertification is:

ch % 12-6 1. Too much ch % 26-13 2. Not enough ch % 165-81 3. About right

NOTE: This questionnaire is being sent to both Water Utility and Wastewater personnel. If you work in the Water Utility only, complete Form B. If you work in Wastewater only, complete Form C. If you work in both, please complete both Forms B and C. Both Plant Superintendents in Water Utility and in Wastewater should each complete Form D if they have one or more employees under their supervision.

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Form B
Water Utility

-Questionnaire-

WATER UTILITY PERSONNEL

13. Please indicate the number of people employed in your Water Utility system.

NA 1. Full Time NA 2. Part Time

14- 15. Below are listed the DNR Certification Subgrades for waterworks personnel. In Column "A" please check (✓) the subgrades in which you are currently certified. In Column "B" please check (✓) those in which you would like to become certified within the next 18 months.

Waterworks Subgrades	14. Column "A" Already Certified (N-188 Ch-417 OMIT-16) Ch - %		15. Column "B" Would Like Certification (N-188 Ch=259 OMIT-136) Ch - %	
G. Groundwater	104-57	1	13-7	1
D. Distribution	160-85	2	12-6	2
Z. Zeolite Softening	26-14	3	20-11	3
I. Iron Removal	35-19	4	32-17	4
L. Lime Softening	6-3	5	22-12	5
S. Surface Water	10-5	6	24-13	6

16- 67. Below are listed additional specific subjects/topics for which you may or may not desire training within the next three years for three possible reasons, such as: (1) for certification, (2) to improve plant operations/efficiency, or (3) for personal knowledge, upgrading and development. Please check (✓) your one most important reason for desiring the training. Check column (4) if training is not desired.

(N=188)

Water Utility Subjects/Topics	OMITS	Reasons for Desiring Training (1) For Certification Ch - %	(2) Improve Operations Ch - %	(3) Personal Development Ch - %	(4) Do Not Desire Ch - %	TOTAL checks
16. DNR Requirements for Sampling, Reporting and Operation	35-19	29 - 15	75 - 40	34 - 18	24 - 13	197
17. Certification Rules	39-21	41 - 22	36 - 19	42 - 22	36 - 19	194
18. Safety	36-19	10 - 5	86 - 46	54 - 29	14 - 7	200
19. Properties of well water	38-20	20 - 11	60 - 32	50 - 27	26 - 14	194
20. Reservoir maintenance	37-20	8 - 4	89 - 47	30 - 16	34 - 18	198
21. Hydrologic cycle, movement of groundwater	44-23	14 - 7	31 - 16	57 - 30	49 - 26	195
22. Distribution systems	26-14	21 - 11	102 - 54	35 - 19	15 - 8	199
23. Distribution systems maintenance	35-19	14 - 7	114 - 61	25 - 13	8 - 4	196
24. Wells - types, construction, capacities	38-20	20 - 11	62 - 33	53 - 28	25 - 13	198
25. Pumping, equipment and controls	24-13	14 - 7	115 - 61	37 - 20	10 - 5	200
26. Pumping equipment maintenance	30-16	10 - 5	114 - 61	37 - 20	10 - 5	201
27. Bacterial contamination/disinfection	40-21	26 - 14	81 - 43	31 - 16	22 - 12	200
28. Chemical Addition, type safety, amounts, troubleshooting	41-22	18 - 10	76 - 40	37 - 20	27 - 14	199
29. Surface water treatment	51-27	15 - 8	25 - 13	30 - 16	78 - 41	199
30. Unaccounted-for water	33-18	3 - 2	101 - 54	34 - 18	26 - 14	197
31. Cold weather operations	36-19	6 - 3	103 - 55	36 - 19	15 - 8	196
32. Leak detection and repair	29-15	8 - 4	116 - 62	35 - 19	9 - 5	197
33. Emergency operations	45-24	4 - 2	95 - 51	37 - 20	13 - 7	195
34. Trenching	49-26	3 - 2	52 - 28	42 - 22	46 - 24	192
35. Well abandonment	43-24	6 - 3	51 - 27	39 - 21	54 - 29	193
36. Waterworks lab testing	45-24	21 - 11	[illegible] - 30	41 - 22	36 - 19	199
37. Lime softening systems	48-26	14 - 7	16 - 9	28 - 15	89 - 47	195
38. Iron removal systems	42-22	16 - 9	34 - 18	42 - 22	60 - 32	194
39. Zeolite softening systems	51-27	12 - 6	20 - 11	31 - 16	77 - 41	191
40. Chemical contamination	49-26	8 - 4	60 - 32	53 - 28	26 - 14	196
41. Water meters testing	31-16	12 - 6	101 - 54	35 - 19	17 - 9	196
42. Water meter maintenance and repair	34-18	10 - 5	102 - 54	35 - 19	15 - 8	196
43. Cutting in valves and services	45-24	6 - 3	83 - 44	36 - 19	24 - 13	194
44. Cross-connection control	38-20	14 - 7	93 - 49	30 - 16	21 - 11	196
45. Public Service Commission Regulations	39-21	19 - 10	61 - 32	51 - 27	25 - 13	195
46. Energy Conservation	50-27	4 - 2	77 - 41	33 - 18	30 - 16	194
47. Use of micro-computers in waterworks operations	49-26	3 - 2	41 - 22	46 - 24	58 - 31	196
48. Management of plant operations and recordkeeping	33-18	14 - 7	89 - 47	45 - 24	18 - 10	199
49. Preventative maintenance	34-18	7 - 4	112 - 60	30 - 16	14 - 7	197
50. Building and ground maintenance	47-25	4 - 2	70 - 37	26 - 14	46 - 24	193
51. Contract services	48-26	4 - 2	45 - 24	40 - 21	58 - 31	195
52. Arithmetic	47-25	9 - 5	32 - 17	55 - 29	53 - 28	196

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Form B (con't)
Water Utility

Water Utility Subjects/Topics	OMITS	(1) For Certification Ch - %	(2) Improve Operations Ch - %	(3) Personal Development Ch - %	(4) Do Not Desire Ch - %	TOTAL CHECKS
53. Algebra	51-27	6-3	22-12	49-26	67-36	194
54. Basic Chemistry	52-27	5-3	28-15	60-32	54-29	199
55. Electronics	51-27	4-2	37-20	63-34	42-22	197
56. Electricity	48-26	5-3	53-28	63-34	28-15	197
57. Fluid Hydraulics	51-27	4-2	34-18	63-34	43-23	195
58. Public Relations	46-24	7-4	49-26	55-29	37-20	194
59. Budgeting	49-26	3-2	57-30	36-19	49-26	194
60. Supervision of personnel	48-26	4-2	44-23	60-32	42-22	198
61. Leadership skills	47-25	4-2	49-26	58-31	42-22	200
62. Administrative skills	49-26	4-2	43-23	60-32	42-22	198
63. Oral communication	50-27	3-2	47-25	57-30	42-22	199
64. Written communication	51-27	2-1	43-23	60-32	39-21	195
65. Improving employee/employer relations	48-26	4-2	54-29	49-26	42-22	197
66. Time management	50-27	3-2	51-27	43-23	49-26	196
67. Problem-solving skills	41-22	6-3	63-34	53-29	35-19	198
68. Other (specify) See Report	170-90	0-0	4-2	1-1	14-7	189

69-72. Please indicate when you would prefer taking your training, and the nature of preferred sessions. (Consider preferred days of the week, time of day, length of session, and season.)

69. Preferred Day of Week (OMITS = 9-5, Ch = 291)

Ch - %
54-29 1. No preference
29-15 2. Monday
71-39 3. Tuesday
59-31 4. Wednesday
50-27 5. Thursday
17-9 6. Friday
2-1 7. Saturday
NA 8. Sunday

70. Preferred Time of Day (OMITS = 10-5, Ch = 206)

Ch - %
36-19 1. No preference
22-12 2. Forenoon only
42-22 3. Afternoon only
7-4 4. Evening only
82-44 5. All day only
3-2 6. All day & evening
4-2 7. Other ________

71. Preferred Length of Sessions (OMITS = 11-6, Ch = 208)

Ch - %
33-18 1. No preference
49-26 2. Half-day session
71-38 3. One-day session
30-16 4. Two-day session
9-5 5. Three-day session
1-1 6. Week-long session
4-2 7. Other ________

72. Preferred Season (OMITS = 12-6, Ch = 266)

Ch - %
63-34 1. Spring
28-15 2. Summer
66-35 3. Fall
97-52 4. Winter

73-74. Please indicate by whom and how you would prefer taking your training. Consider such agencies as Voc-Tech., UW Extension, American Water Works Association, etc. Consider methods of delivery, such as, Conferences, workshops, class lectures, Cable TV, ETN (Educational Telephone Network), etc.

73. Preferred Agency (OMITS = 8-4, Ch = 327)

Ch - %
54-29 1. No preference
89-47 2. Voc-Tech (VTAE)
34-18 3. UW Extension
54-29 4. DNR
11-6 5. Private Consultants
40-21 6. AWWA
32-17 7. WWWOC
3-2 8. WPCF (Wis. Chapter Water Pollution Control Federation)
2-1 9. Other (specify) See Report

74. Preferred Methods of Delivery (OMITS = 11-6, Ch = 382)

Ch - %
29-15 1. No preference
45-24 2. On-the-job training
69-37 3. Classroom lectures
43-23 4. Laboratory experiences
92-49 5. Workshops/Seminars
33-18 6. Conferences
17-9 7. Cable TV/Educ. TV
7-4 8. Video tapes/correspondence
36-19 9. Educ. Telephone Network (ETN)
____ 10. Other (specify) ________

75. Please indicate any suggestions you have for orientation or training of elected officials. What is needed? How could it be done?

76. Any other suggestions or comments? (Attach additional sheets if necessary)

APPENDIX D (continued)

Form C
Wastewater

-Questionnaire-

WASTEWATER PERSONNEL

13. Please indicate the number of people employed in your Wastewater system.

NA 1. Full Time NA 2. Part Time

14- 35. Below are listed the DNR Certification Grades and Subgrades for Wastewater personnel. In Columns "a" (1-4) please circle the grade levels of the subclasses in which you are currently certified. In Columns "b" (1-4) please circle those grade levels for the subclasses for which you desire to become certified.

	Wastewater Sub-Grades	OMITS	(a) (N=181) Current Certification Ch % 1	2	3	4	(b) (N=181) Desired Certification Ch % 1	2	3	4	OMITS
14-15.	— General Introduction	170-94	4-2	3-2	3-2	3-2	5-3	16-9	11-6	19-10	134-7
16-17.	A. Primary Settling	58-32	48-27	45-25	29-16	17-9	4-2	15-8	9-5	20-11	143-7
18-19.	B. Trickling Filter & RBC	77-43	45-25	33-19	20-11	14-8	5-3	15-8	10-6	16-9	146-8
20-21.	C. Activated Sludge	60-33	42-23	50-28	24-13	17-9	10-6	16-9	14-8	21-12	129-7
22-23.	D. Stabilization Ponds/Aerated Lagoon	73-40	55-30	33-18	14-8	14-8	13-7	18-10	12-7	17-9	138-7
24-25.	E. Disinfection	51-28	46-25	57-31	22-12	17-9	6-3	13-7	19-10	24-13	128-7
26-27.	F. Anaerobic Digestion	75-41	38-21	42-23	18-10	14-8	3-2	14-8	10-6	18-10	146-8
28-29.	G. Mechanical Sludge Handling (not including hauling & application	94-52	38-21	28-15	9-5	16-9	6-3	15-8	8-4	11-6	132-8
30-31.	H. Effluent Filtration	93-51	41-23	27-15	10-6	15-8	6-3	16-9	7-4	12-7	149-8
32-33.	I. Phosphorus	98-54	37-20	28-15	9-5	13-7	3-2	12-7	4-2	13-7	136-8
34-35.	J. Laboratory	51-28	45-25	53-29	26-14	19-10	5-3	16-9	15-8	22-12	128-7

36- 119. Below are listed additional specific subjects/topics for which you may or may not desire training within the next three years for three possible reasons, such as: (1) for certification, (2) to improve plant operations/efficiency, or (3) for personal knowledge, upgrading and development. Please check (✓) your one most important reason for desiring the training. Check column (4) if training is not desired. (N = 181)

Wastewater Subjects/Topics	OMITS	Reasons for Desiring Training (1) For Certification Ch %	(2) Improve Operations Ch %	(3) Personal Development Ch %	(4) Do Not Desire Ch %	Total Chec
36. DNR requirements for sampling, reporting and operation	23-13	35-19	72-40	37-20	24-13	191
37. Certification rules	38-17	38-21	37-20	40-22	41-23	186
38. Characteristics of wastewater	33-18	20-11	68-38	40-22	25-14	186
39. Safety	29-16	13-7	76-42	57-31	15-8	190
40. Confined area entry	36-20	8-4	70-39	50-28	23-13	187
41. Wastewater pumping equipment	28-15	8-4	93-51	42-23	15-8	186
42. Collection systems	30-17	10-6	93-51	36-20	19-10	188
43. Collection system maintenance	25-14	8-4	99-55	39-22	19-10	190
44. Collection systems water hydraulics	37-20	6-3	65-36	45-25	34-19	187
45. Plant water hydraulics	38-21	7-4	68-38	35-19	38-21	186
46. Infiltration & inflow identification	33-18	12-7	90-50	32-18	21-12	188
47. Lift station maintenance/troubleshooting	25-14	4-2	105-58	40-22	18-10	192
48. Flow measurement	29-16	14-8	95-52	33-18	21-12	192
49. Electrical equipment and instrumentation	31-17	4-2	78-43	47-26	24-13	187
50. Industrial monitoring	35-19	5-3	58-32	37-20	53-29	188
51. Industrial pretreatment	36-20	5-3	52-29	36-20	58-32	187
52. Shock loads & toxicity problems	33-18	6-3	80-44	30-17	40-22	189
53. Primary settling treatment process	34-19	16-9	58-32	32-18	47-26	187
54. Sludge pumping equipment	36-20	8-4	62-34	44-24	37-20	187
55. Sludge pumping procedures	37-20	9-5	63-35	35-19	42-23	186
56. Mathematical process control calculations	31-17	11-6	59-33	43-24	36-20	188
57. Microscopic examination of organisms	36-20	4-2	50-28	44-24	52-29	186
58. Trickling filter process	38-21	10-6	30-17	32-18	77-43	187
59. Rotating biological contactor process	35-19	11-6	31-17	31-17	76-42	184
60. Nitrogen control	38-21	5-3	51-28	32-18	60-33	186
61. Activated sludge basics	32-18	12-7	48-27	38-21	60-33	190
62. Activated sludge process control	34-19	11-6	65-36	38-21	42-23	190
63. Oxidation ditches	40-22	4-2	31-17	31-17	79-44	185
64. Package plants	35-19	6-3	34-19	36-20	74-41	185
65. Activated sludge modes of operation	33-18	10-6	52-29	42-23	50-28	187
66. Blower and aeration equipment operation	30-17	6-3	93-51	34-19	25-14	188

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APPENDIX D (continued)

Form C (con't)
Wastewater

N = 181

Wastewater Subjects/Topics	OMITS	(1) For Certification Ch - %	(2) Improve Operations Ch - %	(3) Personal Development Ch - %	(4) Do Not Desire Ch - %	TOTAL CHECKS
67. Stabilization pond operation	35-19	14 - 8	44 - 24	26 - 14	72 - 40	191
68. Aerated lagoon process	37-20	14 - 8	40 - 22	25 - 14	72 - 40	188
69. Seepage lagoon	35-19	12 - 7	33 - 18	31 - 17	77 - 43	188
70. Spray irrigation of wastewater	37-20	3 - 2	25 - 14	37 - 20	84 - 46	186
71. Chlorine disinfection	30-17	22 - 12	81 - 45	34 - 19	21 - 12	188
72. Ultraviolet light disinfection	39-22	9 - 5	22 - 12	49 - 27	68 - 38	187
73. Fixed-cover anaerobic digestion	42-23	11 - 6	30 - 17	33 - 18	71 - 39	187
74. Floating-cover anaerobic digestion	42-23	10 - 6	20 - 11	38 - 21	76 - 42	186
75. Digester gas production and use	41-23	9 - 5	33 - 18	35 - 19	70 - 39	188
76. Sludge conditioning	42-23	7 - 4	57 - 31	32 - 18	51 - 28	189
77. Sludge thickening/dewatering	42-23	7 - 4	47 - 26	40 - 22	52 - 29	188
78. Sludge hauling and land application	41-23	10 - 6	68 - 38	31 - 17	38 - 21	188
79. Aerobic digestion	37-20	12 - 7	64 - 35	29 - 16	47 - 26	189
80. Phosphorus removal	42-23	9 - 5	25 - 14	37 - 20	71 - 39	184
81. Laboratory testing for BOD and suspended solids	35-19	22 - 12	57 - 31	41 - 23	33 - 18	188
82. Lab testing for nutrients	40-22	9 - 5	43 - 24	46 - 25	49 - 27	187
83. Fecal coliform and chlorine testing	38-21	21 - 12	67 - 37	31 - 17	30 - 17	187
84. Dissolved oxygen control & determinations	40-22	18 - 10	73 - 40	35 - 19	24 - 13	190
85. Laboratory quality assurance	41-23	15 - 8	66 - 36	39 - 22	28 - 15	189
86. Laboratory instrumentation	39-22	8 - 4	66 - 36	43 - 24	32 - 18	188
87. Sampling for process control	40-22	11 - 6	64 - 35	35 - 19	35 - 19	185
88. Chemical addition	39-22	11 - 6	57 - 31	38 - 21	41 - 23	186
89. Cold weather operations	29-16	8 - 4	104 - 57	29 - 16	21 - 12	191
90. Odor control	33-18	6 - 3	74 - 41	30 - 17	45 - 25	188
91. Emergency operations	35-19	9 - 5	82 - 45	32 - 18	26 - 14	184
92. Physical/Chemical treatment	40-22	7 - 4	50 - 28	39 - 22	50 - 28	186
93. Trenching	41-23	3 - 2	43 - 24	32 - 18	66 - 36	185
94. Corrective maintenance	37-20	4 - 2	90 - 50	34 - 19	24 - 13	189
95. Preventive maintenance	31-17	7 - 4	102 - 56	33 - 18	15 - 8	188
96. Energy conservation	42-23	4 - 2	72 - 40	35 - 19	33 - 18	186
97. Contract services	44-24	3 - 2	36 - 20	41 - 23	61 - 34	185
98. Use of microcomputers in wastewater operations	40-22	4 - 2	36 - 20	47 - 26	60 - 33	187
99. Management of plant operations and recordkeeping	37-20	6 - 3	76 - 42	45 - 25	24 - 13	188
100. Building and ground maintenance	38-21	4 - 2	60 - 33	34 - 19	50 - 28	186
101. Arithmetic	40-22	7 - 4	36 - 20	45 - 25	58 - 32	186
102. Algebra	41-23	8 - 4	31 - 17	40 - 22	67 - 37	187
103. Basic Chemistry	39-22	8 - 4	35 - 19	44 - 24	60 - 33	186
104. Electronics	36-20	6 - 3	46 - 25	56 - 31	43 - 24	187
105. Electricity	37-20	5 - 3	51 - 28	57 - 31	36 - 20	186
106. Fluid hydraulics	39-22	6 - 3	32 - 18	54 - 30	55 - 30	186
107. Public Relations	36-20	3 - 2	40 - 22	60 - 33	47 - 26	186
108. Budget Preparation	36-20	2 - 1	40 - 22	49 - 27	58 - 32	185
(109) 119. Supervision of personnel	35-19	2 - 1	36 - 20	67 - 37	48 - 27	188
110. Leadership skills	37-20	2 - 1	35 - 19	63 - 35	50 - 28	187
111. Administrative skills	36-20	2 - 1	35 - 19	58 - 32	54 - 30	185
112. Oral communication	39-22	2 - 1	31 - 17	62 - 34	51 - 28	185
113. Written communication	40-22	2 - 1	30 - 17	64 - 35	49 - 27	185
114. Improving employee/employer relations	39-22	2 - 1	42 - 23	59 - 33	45 - 25	187
115. Time management	38-21	2 - 1	34 - 19	51 - 28	61 - 34	186
116. Problem-solving skills	38-21	6 - 3	46 - 25	56 - 31	40 - 22	186
117. Other (specify) See Report	177-98	0 - 0	1 - 1	1 - 1	2 - 1	181
118. Other (specify) See Report	178-98	0 - 0	0 - 0	1 - 1	2 - 1	181

Form C (con't)
Wastewater

119- Please indicate when, you would prefer taking your training and the nature of preferred sessions.
122. (Consider preferred days of the week, time of day, length of session, and season.)

(N = 181)
119. Preferred Day of Week (Ch = 272 OMIT = 14-8)

Ch %
57-31 1. No preference
27-15 2. Monday
66-36 3. Tuesday
47-26 4. Wednesday
43-24 5. Thursday
16-9 6. Friday
2-1 7. Saturday
NA 8. Sunday

(N = 181)
120. Preferred Time of Day (Ch = 196 OMIT = 12-7)

Ch %
37-20 1. No preference
20-11 2. Forenoon only
28-15 3. Afternoon only
6-3 4. Evening only
84-46 5. All day only
3-2 6. All day & evening
1-1 7. Other ____________

(N = 181)
121. Preferred Length of Sessions (Ch = 206 OMIT = 14-6)

Ch %
30-17 1. No preference
43-24 2. Half-day session
73-40 3. One-day session
26-14 4. Two-day session
16-9 5. Three-day session
2-1 6. Week-long session
2-1 7. Other ____________

(N = 181)
122. Preferred Season (Ch = 262 OMIT = 19-10)

Ch %
61-34 1. Spring
26-14 2. Summer
64-35 3. Fall
92-51 4. Winter

123- Please indicate by whom and how you would prefer taking your training. Consider such agencies
124. as Voc-Tech schools, UW Extension, DNR, Wisconsin Wastewater Works Operators Conference, Inc., etc. Consider methods of delivery, such as, conferences, workshops, class lectures, Cable TV, ETN (Educational Telephone Network), etc.

(N = 181)
123. Preferred Agency (ch = 335 OMIT = 13-7)

ch %
42-23 1. No preference
84-46 2. Voc-Tech (VTAE)
34-19 3. UW-Extension
64-35 4. DNR
12-7 5. Private Consultants
31-17 6. AWWA
46-25 7. WWWOC
8-4 8. WPCF (Wis. Chapter Water Pollution Control Federation)
1-1 9. Other (specify) ____________

(N = 181)
124. Preferred Methods of Delivery (ch = 367 OMIT = 20-11)

ch %
28-15 1. No preference
37-20 2. On-the-job training
63-35 3. Classroom lectures
42-23 4. Laboratory experiences
87-48 5. Workshops/Seminars
36-20 6. Conferences
18-10 7. Cable TV/Educ. TV
4-2 8. Video tape/correspondence
32-18 9. Educ. Telephone Network (ETN)
NA 10. Other (specify) ____________

125. Please indicate any suggestions you have for orientation or training of elected officials. What is needed? How could it be done?
See Report

126. Any other suggestions or comments? (Attach additional sheets if necessary)
See Report

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APPENDIX E

NUMBER (N) AND PERCENT (%) OF RESPONDENTS BY STATE AND VTAE DISTRICTS IN EACH OF FOUR CATEGORIES OF EMPLOYMENT/WORK STATUS (Q 2)

(% based on N and does not total 100 due to rounding)

Employment/Work Status	State Total		VTAE Districts																													
			One		WWTI		SWTI		MDSN		BTI		GTI		WCTI		MILW		MPTI		LTI		FVTI		NWTI		MSTI		NCTI		NICOLET		WITI	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Water Utility System Only	183	25	3	7	6	16	10	25	25	29	6	26	13	39	14	32	28	51	16	23	11	28	17	25	8	16	7	35	8	22	—	—	11	19
Wastewater System Only	298	41	20	43	14	38	3	8	35	41	12	52	19	58	17	39	20	36	26	38	17	43	37	54	29	57	7	35	16	44	3	20	22	37
Both Water Utility and Wastewater Systems	203	28	21	46	16	43	24	60	18	21	4	17	1	3	9	20	4	7	25	36	10	25	11	16	12	24	6	30	10	28	9	60	22	37
Not Working in Either Water Utility or Wastewater	39	5	2	4	1	3	3	8	7	8	1	4	—	—	4	9	3	5	2	3	2	5	3	4	2	4	—	—	2	6	3	20	4	7
TOTAL	723	99	46	100	37	100	40	101	85	99	23	99	33	100	44	100	55	99	69	100	40	101	68	99	51	101	20	100	36	100	15	100	59	100

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APPENDIX F

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WATER UTILITY SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 16-67) BY STATE AND VTAE DISTRICTS

(NOTE: The percents and rankings for VTAE districts are based on the total responses to Form B from personnel working in water utilities only and those working in both water utilities/wastewater systems)

Water Utility Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N = 376)																				
	State					1-One N = 23		2-WWTI N = 21		3-SWTI N = 31		4-MATC N = 44		5-BTI N = 11		6-GTI N = 13		8-WCTI N = 24		9-MATC N = 32	
		Improve Opns		Pers Dev																	
	Over-all	W.U. N=179 %/R	Both N=188 %/R	W.U N=179 %/R	Both N=188 %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev. %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R
16. DNR Requirements for Sampling, Reporting and Operation	24.5	40/20.5	40/19.5			48/13.5	22	24	24	48	19	30	18	82/1	9	31	8	38	17	44	16
17. Certification Rules						26	30/10.5	0	33	19	26	11	32/5.5	18	18	23	15	21	25	6	19
18. Safety	12.5	52/9.5	46/15			30	35/4.5	29	33	55/11.5	35/13.5	45/11	27	73/3	0	77/4	0	58/4.5	17	50/10.5	16
19. Properties of well water						39	22	19	43/2	29	32	39	25	27	9	15	15	42	21	22	19
20. Reservoir maintenance	14	50/11	47/13.5			48/13.5	17	57	24	61/6.5	16	45/11	9	27	0	54/14.5	8	50/12	13	53/7.5	13
21. Hydrologic cycle, movement of groundwater					30/9.5	9	17	19	29	19	26	25	23	18	9	15	38/3	25	13	16	25
22. Distribution systems	10	53/8	54/8			65/1.5	17	52/2.5	33	61/6.5	16	48/8.5	11	55/9	9	85/1.5	15	33	29/11.5	56/4.5	19
23. Distribution systems maintenance	4.5	52/9.5	61/3			57/4	13	43/8	29	71/2	19	52/5	14	55/9	0	85/1.5	15	54/9	21	50/10.5	16
24. Wells - types, construction, capacities				33/9		39	26	33	33	32	42/6.5	27	32/5.5	18	18	15	15	42	29/11.5	6	34/9.5
25. Pumping, equipment and controls	4.5	54/6	61/3			52/7	26	48/6	33	61/6.5	29	50/7	20	73/3	9	46	31/8.5	54/9	29/11.5	56/4.5	16
26. Pumping equipment maintenance	4.5	54/6	61/3			52/7	17	38/11	38/6.5	74/1	19	55/3	16	55/9	9	62/9.5	15	58/4.5	21	50/10.5	16
27. Bacterial contamination/disinfection	20	42/18	43/17			52/7	9	29	33	42	16	32	14	55/9	18	38	8	46	8	47/13.5	19
28. Chemical Addition, type safety, amounts, troubleshooting	15.5	49/12	40/19.5			48/13.5	17	52/2.5	24	52/14	19	39	14	55/9	9	62/9.5	8	42	17	41	16
29. Surface water treatment						17	9	0	5	13	29	9	16	9	0	38	15	13	8	31	13
30. Unaccounted-for water	7.5	55/3.5	54/8			52/7	22	52/2.5	24	61/6.5	23	39	9	55/9	0	62/9.5	15	58/4.5	13	53/7.5	6
31. Cold weather operations	7.5	54/6	55/6			52/7	17	46/6	38/6.5	58/10	19	52/5	11	36	9	62/9.5	15	50/12	25	56/4.5	6
32. Leak detection and repair	2	55/3.5	62/3			57/4	26	52/2.5	29	68/3	23	61/1	14	36	0	77/4	8	58/45	17	59/1.5	13
33. Emergency operations	6	58/2	51/11			48/13.5	22	48/6	29	61/6.5	19	52/5	20	27	27	77/4	15	50/12	17	56/4.5	19
34. Trenching						26	22	19	29	26	23	34	16	55/9	18	38	15	33	25	25	19
35. Well abandonment						26	22	29	33	32	19	27	18	27	27	15	15	33	33/4.5	13	22
36. Waterworks lab testing						35	26	14	29	23	39/9	34	20	27	36/12.5	46	23	25	25	34	22
37. Lime softening systems						17	9	0	10	6	26	5	23	0	0	15	23	13	13	3	19
38. Iron removal systems						39	22	19	19	10	32	11	25	0	0	23	31/8.5	29	25	3	19
39. Zeolite softening systems						17	9	0	14	6	23	9	23	9	0	23	31/8.5	17	21	3	19
40. Chemical contamination	24.5	40/20.5				30	26	19	33	32	26	32	27	27	27	46	15	33	21	44	16
41. Water meters testing	10	45/4.5	54/8			48/13.5	26	38/11	24	52/14	29	45/11	14	64/5.5	0	46	23	58/4.5	13	41	25
42. Water meter maintenance and repair	10	45/4.5	54/8			48/13.5	30/10.5	38/11	29	55/11.5	32	48/8.5	16	73/3	0	54/14.5	23	58/4.5	8	41	22
43. Cutting in valves and services	18.5		44/16			52	4	19	38/6.5	39	29	43	16	45/14.5	9	46	23	29	29/11.5	31	25
44. Cross-connection control	15.5	46/13	49/12			57/4	4	33	29	52/14	19	39	18	45/14.5	9	54/14.5	23	54/9	25	47/13.5	19
45. Public Service Commission Regulations						30	26	24	43/2	48	26	32	30/9.5	18	55/3	46	31/8.5	29	25	34	31/13
46. Energy Conservation	21.5	41/19	41/18			43	9	29	24	35	16	39	18	18	36/12.5	62/9.5	8	46	21	38	25
47. Use of micro-computers in waterworks operations						30	17	10	14	23	39/9	27	30/9.5	27	9	46	8	25	29/11.5	44	28
48. Management of plant operations and recordkeeping	17	43/17	47/13.5			35	30/10.5	38/11	38/6.5	35	45/4	43	25	45	36/12.5	46	31/8.5	46	25	50/10.5	25
49. Preventative Maintenance	1	63/1	60/5			65/1.5	4	38/11	33	61/6.5	19	59/2	20	64/5.5	18	69/6	15	71/1	17	59/1.5	16

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APPENDIX F (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WATER UTILITY SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 16-67) BY STATE AND VTAE DISTRICTS
(NOTE: The percent and rankings for VTAE districts are based on the total responses to Form B from personnel working in water utilities only and those working in both water utilities/wastewater systems)

Water Utility Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N = 376)																					
	State					1-One N = 23		2-WWTI N = 21		3-GWTI N = 31		4-HRTC N = 44		5-BTI N = 11		6-GTI N = 13		8-WCTI N = 24		9-HATC N = 32	
	Over-all	Improve Opns W.U. N=179 %/R	Improve Opns Both N=188 %/R	Pers.Dev. W.U N=179 %/R	Pers.Dev. Both N=188 %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R
50. Building and ground maintenance	18.5	44/16				35	13	33	29	30	16	43	14	45	18	62/9.5	15	42	21	41	16
51. Contract Services						26	9	10	33	26	26	30	14	36	27	54/14.5	15	25	25	34	13
52. Arithmetic						22	22	5	33	29	35/13.5	14	30/9.5	18	45/6	23	23	13	21	19	25
53. Algebra						13	17	0	33	13	32	11	25	9	27	8	23	4	13	3	31/13
54. Basic Chemistry					32/5.5	26	30/10.5	5	38/6.5	10	45/4	16	27	18	36/12.5	23	31/8.5	8	21	19	22
55. Electronics	24.5			40/3.5	34/2	26	30/10.5	10	38/6.5	23	35/13.5	11	41/1	0	55/3	38	31/8.5	25	33/4.5	19	34/9.5
56. Electricity	12.5			43/1	34/2	39	30/10.5	29	43/2	19	48/1.5	16	39/2	0	64/1	38	38/3	25	38/1	25	34/9.5
57. Fluid Hydraulics				36/7	34/2	13	30/10.5	5	33	16	35/13.5	18	30/9.5	0	36/12.5	38	15	17	29/11.5	16	38/6.5
58. Public Relations						26	26	24	24	26	45/4	30	18	27	45/6	46	23	17	33/4.5	25	31/13
59. Budgeting						35	22	14	19	35	13	23	14	18	36/12.5	23	16	25	21	34	34/9.5
60. Supervision of personnel					32/5.5	30	38/2	14	19	26	35/13.5	30	25	27	36/12.5	38	8	21	33/4.5	22	47/4.5
61. Leadership skills				38/6	31/8	22	30/10.5	14	33	29	39/9	30	25	27	36/12.5	23	31/8.5	25	29/11.5	19	50/2
62. Administration skills				34/8	32/5.5	22	30/10.5	10	33	35	29	25	32/5.5	36	27	31	23	25	21	22	50/2
63. Oral communication	24.5			40/3.5	30/9.5	13	35/4.5	14	33	35	35/13.5	25	32/5.5	18	36/12.5	15	38/3	13	33/4.5	13	50/2
64. Written communication				39/5	32/5.5	22	30/10.5	19	33	32	42/6.5	20	34/3	36	27	31	23	13	33/4.5	13	47/4.5
65. Improving employee/employer relations						22	39/2	24	24	23	35/13.5	41	18	27	45/6	31	23	33	29/11.5	34	22
66. Time management						35	22	10	24	29	26	27	20	18	36/12.5	38	15	21	25	34	22
67. Problem-solving skills	21.5			41/2		30	39/2	29	33	29	48/1.5	36	20	18	55/3	23	46/1	33	21	28	38/6.5

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APPENDIX F (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WATER UTILITY SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 16-67) BY STATE AND VTAE DISTRICTS
(NOTE: The percents and rankings for VTAE districts are based on the total responses to Form C from personnel working in water utilities only and those working in both water utility/wastewater systems)

Water Utility Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N = 376)																				
	State					10-MPTI N = 40		11-LTI N = 19		12-FVTI N = 30		13-NWTI N = 20		14-NETI N = 12		15-NCTI N = 14		16-Nicolet N = 8		17-WITI N = 33	
		Improve Opns		Pers Dev																	
	Over-all	W.U. N=179 %/R	Both N=188 %/R	W.U N=179 %/R	Both N=188 %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev. %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R
16. DNR Requirements for Sampling, Reporting and Operation	24.5	40/19.5				28	10	53	16	53/5	17	55/15	35	33	25	29	43/6	38	0	30	9
17. Certification Rules						23	13	16	26	27	17	10	35	25	17	14	21	13	13	6	6
18. Safety	12.5	52/9.5	46/15			43/12.5	30	68/8.5	21	37	33/11	55/15	30	67/5	8	57/9.5	21	63/7	13	36/15.5	21
19. Properties of well water						33	23	16	32	23	27	50	40	33	42/5	29	29	25	13	24	24
20. Reservoir maintenance	14	50/11	47/13.5			48/7	25	68/8.5	11	43/13.5	20	65/9.5	20	42	25	50/16	14	25	13	27	9
21. Hydrologic cycle, movement of groundwater					30/9.5	10	35/11	11	32	10	40/2.5	20	60/2	25	25	21	36/14.5	25	38/1.5	6	33/3
22. Distribution systems	10	53/8	54/8			45/9.5	23	63/13	26	43/13.5	20	85/1.5	20	50/16.5	8	50/16	21	63/7	13	42/9.5	12
23. Distribution systems maintenance	4.5	52/9.5	61/3			50/5.5	28	79/4	5	47/10	20	85/1.5	20	42	33/11.5	50/16	29	75/3	0	39/13	15
24. Wells - types, construction capacities				33/9		30	28	21	32	20	23	35	50/6.5	42	25	29	29	75/3	0	18	33/3
25. Pumping, equipment and controls	4.5	54/6	61/3			55/2.5	30	84/2	5	60/2.5	27	70/6	40	67/5	17	57/9.5	14	63/7	0	45	9
26. Pumping equipment maintenance	4.5	54/6	61/3			50/5.5	35/11	84/2	5	50/7.5	33/11	80/3.5	30	83/1	8	43	36/14.5	75/3	0	48/1.5	15
27. Bacterial contamination/disinfection	20	42/18	43/17			33	15	53	[illegible]	50/7.5	30	50	50/6.5	67/5	17	36	43/6	25	0	45/5	9
28. Chemical Addition, type safety, amounts, troubleshooting	15.5	49/12	40/19.5			35	25	53	5	43/13.5	23	50	40	33	42/5	57/9.5	14	25	0	39/13	21
29. Surface water treatment						3	18	32	16	23	20	10	25	17	8	14	14	25	0	15	15
30. Unaccounted-for water	7.5	55/3.5	54/8			63/1	28	74/6	5	43/13.5	20	45	45/12	67/5	8	64/5.5	14	75/3	0	45/5	18
31. Cold weather operations	7.5	54/6	55/6			45/9.5	25	84/2	16	47/10	23	65/9.5	35	58/10.5	8	79/3	7	38	13	45/5	9
32. Leak detection and repair	2	55/3.5	62/1			53/4	25	63/13	16	43/13.5	20	70/6	30	58/10.5	17	86/1	0	75/3	0	45/5	9
33. Emergency operations	6	58/2	51/11			45/9.5	23	74/6	21	67/1	17	55/15	30	50/16.5	17	79/3	7	38	13	36/15.5	12
34. Trenching						38	15	47	16	13	23	25	35	33	25	50/16	14	25	13	18	15
35. Well abandonment						33	13	26	16	10	17	25	45/12	33	25	21	29	38	13	18	18
36. Waterworks lab testing						33	18	47	21	30	33/11	30	40	33	33/11.5	64/5.5	14	38	0	18	18
37. Lime softening systems						8	15	5	16	13	10	5	20	17	17	29	7	13	0	6	9
38. Iron removal systems						15	28	0	26	20	10	10	30	25	25	43	7	25	0	9	12
39. Zeolite softening systems						18	15	5	16	20	7	20	30	8	17	14	29	13	0	6	12
40. Chemical contamination	24.5	40/20.5				28	30	53	32	40	23	45	45/12	33	17	57/9.5	29	38	13	30	18
41. Water meters testing	10	45/4.5	54/8			45/9.5	25	74/6	21	30	20	65/9.5	15	58/10.5	25	57/9.5	21	50/11.5	0	42/9.5	15
42. Water meter maintenance and repair	10	45/4.5	54/8			43/12.5	30	68/8.5	16	27	17	60/12.5	10	58/10.5	17	57/9.5	14	63/7	0	48/1.5	15
43. Cutting in valves and services	18.5		44/16			40	28	53	16	27	23	60/12.5	25	59/16.5	33/11.5	50/16	21	38	13	42/9.5	12
44. Cross-connection control	15.5	46/13	49/12			30	23	68/8.5	16	53/5	17	70/6	30	33	25	50	43/6	50/11.5	0	42/9.5	15
45. Public Service Commission Regulations						30	28	37	42/7	33	27	35	55/4	50	0	43	36/14.5	50/11.5	0	24	18
46. Energy Conservation	21.5	41/19	41/18			35	30	47	16	47/10	17	45	45/12	33	17	57	21	38	13	39/13	15
47. Use of micro-computers in waterworks operations						28	35/11	42	21	27	23	20	35	17	25	29	14	38	0	12	12
48. Management of plant operations and recordkeeping	17	43/17	47/13.5			40	25	58/15	26	53/5	20	65/9.5	45/12	58/10.5	17	50/16	21	38	0	30	21
49. Preventative Maintenance	1	63/1	60/5			55/2.5	28	63/13	32	60/2.5	23	80/3.5	25	75/2	8	79/3	14	50/11.5	0	45/5	18

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APPENDIX F (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WATER UTILITY SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 16-67) BY STATE AND VTAE DISTRICTS
(NOTE: The percents and rankings for VTAE districts are based on the total responses to Form B from personnel working in water utilities only and those working in both water utility/wastewater systems)

Water Utility Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N = 376)																				
		State				10-MPTI N = 40		11-LTI N = 19		12-FVTI N = 30		13-NEWTI N = 20		14-MSTI N = 12		15-NCTI N = 14		16-NICOLET N = 8		17-WITI N = 33	
		Improve Opns		Pers.Dev.																	
	Over-all	W.U. N=179 %/R	Both N=188 %/R	W.U N=179 %/R	Both N=188 %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev. %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R
50. Building and Maintenance	18.5	44/16				40	20	42	32	30	17	50	25	58/10.5	8	43	29	38	0	24	6
51. Contract services						20	35/11	26	26	17	17	40	30	25	25	21	14	25	13	12	12
52. Arithmetic						10	38/6	11	32	17	40/2.5	20	40	25	42/5	21	36/14.5	25	0	9	21
53. Algebra						5	25	5	37/12	10	20	15	40	17	42/5	7	43/6	25	13	6	24
54. Basic Chemistry					32/5.5	5	33/16	5	37/12	17	40/2.5	25	35	25	33/11.5	14	43/6	25	13	9	33/3
55. Electronics	24.5			40.3.5	34/2	15	38/6	16	37/12	23	40/2.5	35	45	17	58/1	14	43/6	25	25/4.5	3	30
56. Electricity	12.5			43/1	34/2	25	33/16	21	32	23	33/11	30	45/12	33	50/2	29	57	38	13	12	36/1
57. Fluid Hydraulics				36/7	34/2	20	43/1.5	26	42/7	17	33/11	25	65/1	25	42/5	29	29	13	25/4.5	6	30/5
58. Public Relations						28	38/6	16	47/3	23	20	35	40	50/6.5	17	21	50/1	50/11.5	13	12	27/6.5
59. Budgeting						35	28	32	16	37	13	35	40	42	17	36	14	50/11.5	25/4.5	21	12
60. Supervision of personnel					32/5.5	28	33/16	21	42/7	40	33/11	30	55/4	25	33/11.5	21	29	13	38/1.5	18	15
61. Leadership skills				38/6	31/8	30	35/11	21	53/1	40	37/5.5	35	45/12	33	33/11.5	21	43/6	25	13	15	18
62. Administrative Skills				34/8	32/5.5	25	38/6	21	47/3	33	30	35	55/4	25	33/11.5	14	43/6	13	25/4.5	18	12
63. Oral Communication	24.5			40/3.5	30/9.5	25	38/6	11	42/7	33	33/11	40	40	33	33/11.5	21	36/14.5	25	13	15	21
64. Written Communication				39/5	32/5.5	23	40/3	11	47/3	30	33/11	35	40	33	25	14	36/14.5	25	13	9	27/6.5
65. Improving employee/employer relations						30	33/16	26	37/12	40	33/11	45	40	67/5	8	29	36/14.5	25	13	15	15
66. Time management						23	33/16	16	37/12	43/13.5	20	30	40	50/16.5	8	21	36/14.5	25	13	18	12
67. Problem-solving skills	21.5			41/2		25	43/1.5	32	42/7	33	37/5.5	35	45/12	42	17	14	43/6	25	13	24	18

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APPENDIX G

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKING OF WATER UTILITY SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 16-67) BY DNR DISTRICTS
(NOTE: The percents and rankings for DNR districts are based on the total responses to Form B from personnel working in water utilities only and those working in both water utilities/wastewater systems.)

Water Utility Subjects/Topics	State					Percent/Rank of Responses by State and DNR Districts (N = 376)											
		Improve Opns		Pers Dev		1 - Southern N = 118		2 - Southeast N = 84		4 - L. Mich N = 61		6 - W. Central N = 48		7 - N. Central N = 34		8 - Northeast N = 30	
	Over-all Rank	W.U. N=179 %/R	Both N=188 %/R	W.U. N=179 %/R	Both N=188 %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R
16. DNR Requirements for Sampling, Reporting.. and Operation..............................	24.5	40/20.5	40/19.5			37	15	39	13	56/11	23	40	21	32	26	27	13
17. Certification Rules..........................						18	23	14	21	20	25	15	27	18	21	3	7
18. Safety....................................	12.5	52/9.5	46/15			47/10	27	58/8.5	15	51	30	35	33/4.5	59/7	15	33	23/13.5
19. Properties of well water..................						31	24	30	24	33	28	31	29	29	29/13	20	30/6
20. Reservoir maintenance......................	14	50/11	47/13.5			47/10	14	55/11	12	56/11	20	52/8.5	21	41	18	23	10
21. Hydrologic cycle, movement of groundwater					30/9.5	17	25	17	26	16	44/2.5	15	21	24	32/8	7	40/1
22. Distribution systems........................	10	53/8	54/8			49/7.5	16	55/11	21	62/6.5	20	58/1	23	56/9	15	40/8	17
23. Distribution systems maintenance...........	4.5					54/5	18	63/3	17	64/5	16	52/8.5	21	53/11.5	24	37/12	17
24. Wells - types, construction, capacities...				33/9		25	33	24	29	26	31	40	29	44	21	13	37/2.5
25. Pumping, equipment and controls............	4.5	54/6	61/3			55/4	24	58/8.5	23	67/2	26	56/3	27	62/5.5	12	37/12	13
26. Pumping equipment maintenance..............	4.5	54/6	61/3			56/3	22	60/6	17	67/2	26	52/8.5	25	65/3.5	18	40/8	20
27. Bacterial contamination/disinfection......	20	42/18	43/17			33	14	45	14	56/11	31	48	19	41	24	37/12	13
28. Chemical Addition, type safety, amounts, troubleshooting..............................	15.5	49/12	40/19.5			39	18	46	14	51	25	56/3	19	41	21	30	27/9
29. Surface water treatment....................						8	17	23	13	25	21	13	8	15	12	13	13
30. Unaccounted-for water.......................	7.5	55/3.5	54/8			52/6	16	60/6	12	51	25	54/5.5	23	65/3.5	12	43/4	17
31. Cold weather operations.....................	7.5	54/6	55/6			49/7.5	16	60/6	15	59/8	26	50/12.5	27	62/5.5	12	43/4	7
32. Leak detection and repair...................	2	55/3.5	61/1			57/2	17	64/2	15	56/11	21	56/3	25	71/1	9	43/4	10
33. Emergency operations........................	6	58/2	51/11			48/6	21	61/4	18	66/4	21	50/12.5	23	56/9	15	33	13
34. Trenching..................................						31	18	37	19	25	25	23	25	35	21	20	13
35. Well abandonment............................						27	18	24	23	20	25	33	25	29	24	10	23/13.5
36. Waterworks lab testing......................						26	25	38	21	34	34	29	25	44	21	17	20
37. Lime softening systems......................						4	20	11	15	10	15	10	6	18	12	3	10
38. Iron removal systems........................						8	26	17	24	15	18	29	17	29	15	10	13
39. Zeolite softening systems...................						10	19	12	23	20	13	10	8	9	21	3	13
40. Chemical contamination......................	24.5	40/20.5				27	28	43	18	48	33	27	27	41	24	30	20
41. Water meters testing........................	10	45/4.5	54/8			45	19	55/11	20	49	18	46	23	53/11.5	21	43/4	17
42. Water meter maintenance and repair.........	10	45/4.5	54/8			47/10	23	56/10	17	44	15	48	27	56/9	15	47/1	17
43. Cutting in valves and services..............	18.5		44/16			37	22	38	26	44	21	44	17	44	26	40/8	13
44. Cross-connection control....................	15.5	46/13	49/12			37	19	54	19	62/6.5	21	52/8.5	15	41	29/13	37/12	17
45. Public Service Commission Regulations.....						33	30	36	30/10	36	39/9.5	29	31/9	47	15	20	23/13.5
46. Energy Conservation.........................	21.5	41/19	41/18			33	23	48	19	46	26	40	15	41	21	37/12	17
47. Use of micro-computers in waterworks operations..............................						24	31/13	39	24	30	28	21	15	26	18	10	13
48. Management of plant operations and recordkeeping.............................	17	43/17	47/13.5			39	31/13	52	24	56/11	33	35	33/4.5	50	18	30	20
49. Preventative Maintenance.....................	1	63/1	60/5			58/1	21	65/1	18	67/2	26	54/5.5	17	68/2	12	43/4	20

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APPENDIX G (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKING OF WATER UTILITY SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 16-67) BY DNR DISTRICTS
(NOTE: The percents and rankings for DNR districts are based on the total responses to Form B from personnel working in water utilities only and those working in both water utilities/wastewater systems)

Water Utility Subjects/Topics	Percent/Rank of Responses by State and DNR Districts (N = 376)																
	State					1 - Southern N = 118		2 - Southwest N = 84		4 - L. Mich N = 61		6 - W. Central N = 48		7 - N. Central N = 34		8 - Northeast N = 30	
		Improve Opns		Pers Dev													
	Over-all Rank	W.U. N=179 %/R	Both N=188 %/R	W.U. N=179 %/R	Both N=188 %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R
50. Building and ground maintenance	18.5	44/16				41	16	45	18	39	23	33	19	44	18	27	7
51. Contract services						25	24	36	19	26	23	17	19	24	21	13	13
52. Arithmetic						14	34/9	19	24	18	39/9.5	19	27	21	32/8	3	23/13.5
53. Algebra						8	27	7	21	11	31	13	27	12	38/3.5	0	23/13.5
54. Basic Chemistry					32/5.5	9	35/7	14	23	20	39/9.5	19	33/4.5	21	32/8	7	37/2.5
55. Electronics	24.5			40/3.5	34/2	13	42/2	25	30/10	26	43/5.5	17	31/9	18	47/1.5	3	30/6
56. Electricity	12.5			43/1	34/2	16	43/1	31	32/6.5	25	38	29	38/1.5	32	47/1.5	13	33/4
57. Fluid Hydraulics				36/7	34/2	14	36/5	24	30/10	21	48/1	10	33/4.5	21	35/5	7	27/9
58. Public Relations						26	32/11	29	31/8	26	33	23	27	38	29/13	10	30/6
59. Budgeting						27	30	32	23	34	23	29	19	41	21	17	13
60. Supervision of personnel					32/5.5	25	31/13	29	33/4.5	33	44/2.5	25	27	21	32/8	13	17
61. Leadership skills				38/6	31.8	26	34/9	25	38/2	36	43/5.5	23	29	26	32/8	10	20
62. Administration skills				34/8	32/5.5	25	34/9	29	33/4.5	31	43/5.5	21	27	18	38/3.5	13	13
63. Oral Communication	24.5			40/3.5	33/9.5	24	36/5	18	39/1	31	38	17	31/9	26	29/13	13	23/13.5
64. Written Communication				39/5	32/5.5	23	38/3	20	37/3	28	39/9.5	19	31/9	24	26	10	27/9
65. Improving employee/employer relations						30	30/15	35	25	39	38	23	31/9	41	21	17	13
66. Time management						23	27	31	21	34	31	23	25	32	21	20	10
67. Problem-solving skills	21.5			41/2		29	36/5	31	31/6.5	34	43/5.5	31	38/1.5	24	29/13	20	17

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APPENDIX H

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WASTEWATER SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 36-116) BY STATE AND VTAE DISTRICTS

(NOTE: The percents and rankings for VTAE districts are based on the total responses to Form C from personnel working in wastewater systems only and those in both wastewater/water utility systems)

Wastewater Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N=504)																		
	State					1 - One N = 40		2 - WWTI N = 2[illegible]		3 - SWTC N = 26		4 - MATC-MSN N = 53		5 - BTI N = 16		6 - GTI N = 19		8 - WCTI N = 28	
		Improve Opns.		Pers. Dev.															
	Over-All Rank	W.W. N=301 %/R	Both N=181 %/R	W. W. N=301 %/R	Both N=181 %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R
36. DNR requirements for sampling, reporting, and operation	27.5		40/18			40/13.5	18	29	21	54/11	15	19	30	56/7	19	42/21	16	32	29
37. Certification rules						18	15	4	14	12	27/21	11	30	25	13	11	26	7	29
38. Characteristics of wastewater						43/10.5	13	25	21	38	19	25	26	50/11	25	53/5.5	21	39/7.5	21
39. Safety	21.5		42/14.5		31/9.5	35	25	29	32/5	46	35/4.5	34	42/6	63/4	19	47/13.5	37/12	25	50/1
40. Confined area entry						20	26	14	29/14	35	27/21	34	32/18	31	13	42/21	21	25	32/19.5
41. Wastewater pumping equipment	6.5	39/9	51/6.5			53/5	15	43/7	25	54/11	23	42/14	28	56/7	31/25	47/13.5	21	36/14	36/13.5
42. Collection systems	6.5		51/6.5			33	18	36/11.5	18	58/5.5	15	36	21	25	31/25	37	21	25	29
43. Collection system maintenance	4		55/4			33	15	39/8	18	65/2	12	42/14	25	44/17	25	47/13.5	21	36/14	32/19.5
44. Collection systems water hydraulics						20	28	25	14	46	23	25	30	19	44/6	21	42/8	18	29
45. Plant water hydraulics						23	20	32/17.5	21	35	19	21	40/10.5	31	31/25	32	37/12	29	21
46. Infiltration & inflow identification	9	40/7.5	50/8.5			30	15	36/11.5	25	50/17	15	47/5.5	30	50/11	6	47/13.5	21	36/14	18
47. Lift station maintenance/troubleshooting	1		58/1			40/13.5	25	57/1	21	58/5.5	19	45/7.5	28	63/4	25	36	16	39/7.5	46/2
48. Flow measurement	5	42/4	52/5			50/6.5	20	54/2.5	18	69/1	15	43/10	25	44/17	19	53/5.5	32/21.5	43/3.5	25
49. Electrical equipment and instrumentation	17.5		43/13			35	30/6.5	36/11.5	25	46	27	42/14	30	44/17	44/6	42/21	32/21.5	39/7.5	36/13.5
50. Industrial monitoring						35	23	18	21	35	8	47/5.5	19	38	19	58/1.5	5	21	21
51. Industrial pretreatment						30	20	18	25	31	12	43/10	23	13	38/13	53/5.5	11	25	18
52. Shock loads & toxicity problems	9	50/1	44/12			58/2	15	29	29/14	38	15	51/2	23	63/4	25	37	21	50/1	21
53. Primary settling treatment process						30	15	29	21	42	23	26	11	38	13	37	11	29	18
54. Sludge pumping equipment						38/15.5	23	25	21	50/17	23	34	32/18	38	38/13	32	26	32	29
55. Sludge pumping procedures						35	18	18	21	58/5.5	15	30	30	31	13	32	26	32	21
56. Mathematical process control calculations						30	25	18	29/14	50/17	19	23	32/18	31	38/13	37	21	21	32/19.5
57. Microscopic examination of organisms						20	18	14	29/14	38	27/21	32	25	31	25	37	32/21.5	18	39/8
58. Trickling filter process						23	8	11	25	19	23	15	19	6	19	16	5	7	25
59. Rotating biological contactor process						25	10	11	18	19	19	21	25	19	19	21	11	14	32/19.5
60. Nitrogen Control						30	18	14	18	35	15	40/10.5	21	25	13	42/21	11	29	29
61. Activated sludge basics						28	15	18	25	38	23	17	25	6	25	32	26	21	21
62. Activated sludge process control						35	13	21	32/5	50/17	27/21	25	30	19	25	42/21	21	32	25
63. Oxidation ditches						18	13	14	21	12	15	17	23	0	19	16	16	21	25
64. Package plants						15	10	11	25	23	15	6	32/18	0	19	21	16	14	29
65. Activated sludge modes of operation						28	18	11	21	42	27/21	25	32/18	19	25	37	21	32	25
66. Blower and aeration equipment operation						55/3.5	10	36/11.5	29/14	58/5.5	12	42/14	32/18	50/11	19	32	32/21.5	36/14	29
67. Stabilization pond operation						25	10	21	11	19	23	15	25	13	19	11	16	11	11
68. Aerated lagoon process						30	10	21	7	15	15	17	21	13	19	5	16	14	7
69. Seepage lagoon						20	13	21	18	8	12	13	21	6	13	5	11	7	18
70. Spray irrigation of wastewater						23	10	18	25	4	12	6	23	0	19	5	11	7	14
71. Chlorine disinfection	12.5		45/10.5			38/15.5	18	32/17.5	18	58/5.5	15	34	15	44/17	31/25	31	16	36/14	29
72. Ultraviolet light disinfection	27.5			40/10		18	23	11	32/5	4	27/21	21	38/12	0	50/2	11	47/3	7	21
73. Fixed-cover anaerobic digestion						30	15	14	14	19	19	21	19	19	13	5	21	14	29
74. Floating-cover anaerobic digestion						25	20	14	14	4	23	26	19	25	13	26	16	14	29
75. Digester gas production and use						38	15	18	11	19	12	26	28	25	31/25	32	11	21	29
76. Sludge conditioning						38	18	18	11	35	31/9.5	32	25	13	19	21	16	32	11
77. Sludge thickening/dewatering						35	23	18	14	19	31/9.5	28	30	6	31/25	37	11	32	25

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APPENDIX H (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WASTEWATER SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 36-116) BY STATE AND VTAE DISTRICTS
(NOTE: The percents & rankings for VTAE districts are based on the total responses to Form C from personnel working in wastewater systems only and those working in both wastewater/water utility systems)

Wastewater Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N=304)																	
	State					1 - One N = 40		2 - WWTI N = 28		3 - SWTI N = 26		4 - MATC-MSN N = 53		5 - BTI N = 16		6 - GTI N = 19		8 - WCTI N = 28	
	Over-All Rank	Improve Opns. W.W. N=301 %/R	Improve Opns. Both N=181 %/R	Pers. Dev. W. W. N=301 %/R	Pers. Dev. Both N=181 %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R
78. Sludge hauling and land application		38/10.5				55/3.5	20	32/17.5	21	54/11	23	43/10	17	31	13	47/13.5	21	39/7.5	11
79. Aerobic digestion						35	15	21	14	38	15	23	19	31	25	21	21	36/14	21
80. Phosphorus removal						15	13	7	25	8	15	8	25	6	31/25	26	21	25	18
81. Laboratory testing for BOD and suspended solids						33	28/11	14	21	46	15	30	19	56/7	19	42/21	21	21	32/19.5
82. Lab testing for nutrients						23	28/11	18	32/5	23	19	23	30	19	31/25	32	26	18	21
83. Fecal coliform and chlorine testing						38	20	29	25	46	23	36	23	31	25	37	16	25	21
84. Dissolved oxygen control & determinations	27.5		40/18			33	25	32/17.5	21	50/17	27/21	32	21	44/17	19	42/21	21	32	29
85. Laboratory quality assurance		30/10.5				35	25	21	25	42	27/21	42/14	21	50/11	19	53/5.5	11	29	18
86. Laboratory instrumentation						33	23	21	21	46	27/21	40/18.5	21	38	31/25	47/13.5	21	29	29
87. Sampling for process control						35	20	36/11.5	18	35	12	32	19	44/17	25	53/5.5	11	36/14	18
88. Chemical addition						35	13	25	18	23	27/21	23	26	25	31/25	42/21	16	39/7.5	25
89. Cold weather operations	2	48/2	57/2			60/1	8	54/2.5	18	58/5.5	27/21	58/1	15	50/11	13	47/13.5	21	43/3.5	18
90. Odor control	26.5	41/5.5	41/16			43/10.5	15	46/5	21	54/11	15	40/18.5	11	38	19	16	26	36/14	32/19.5
91. Emergency operations	12.5	41/5.5	45/10.5			43/10.5	20	46/5	21	38	19	45/7.5	17	38	19	47/13.5	26	32	29
92. Physical/Chemical treatment						30	15	21	21	19	27/21	30	21	13	25	32	32/21.5	29	11
93. Trenching						13	13	11	18	23	15	11	19	6	31/25	21	5	7	18
94. Corrective maintenance	9	40/7.5	50/8.5			48/8	23	32/17.5	21	54/11	23	49/3.5	17	69/2	19	47/13.5	21	36/14	21
95. Preventative maintenance	3	44/3	56/3			50/6.5	25	46/5	25	50/17	19	49/3.5	19	75/1	19	58/1.5	16	46/2	21
96. Energy conservation	27.5		40/18			30	20	25	29/14	42	23	40/18.5	21	38	25	42/21	32/21.5	29	14
97. Contract services						10	10	18	11	8	23	25	26	19	25	21	26	14	39/8
98. Use of microcomputers in wastewater operations						23	33/3	18	18	23	27/21	25	28	6	38/13	53/5.5	26	25	29
99. Management of plant operations and recordkeeping	21.5		42/14.5			43/10.5	13	32/17.5	25	50/17	35/4.5	34	30	44/17	31/25	47/13.5	32/21.5	39/7.5	29
100. Building and ground maintenance						33	15	36/11.5	11	27	19	23	19	19	25	37	21	14	21
101. Arithmetic						20	13	4	32/5	38	23	9	25	6	38/13	16	21	7	11
102. Algebra						20	13	4	29/14	27	27/21	11	23	0	50/2	16	21	11	11
103. Basic Chemistry						18	15	11	25	38	31/9.5	19	21	6	50/2	32	32/21.5	11	14
104. Electronics	17.5			43/5	31/9.5	25	30/6.5	11	29/14	31	42/2	13	42/6	13	38/13	32	37/12	29	39/8
105. Electricity	12.5			45/1.5	31/9.5	30	25	18	36/1	23	46/1	17	42/6	13	44/6	26	42/8	32	32/19.5
106. Fluid hydraulics					30/12	20	23	4	25	12	31/9.5	13	43/2.5	6	31/25	32	37/12	14	29
107. Public Relations					33/5.5	20	30/6.5	14	25	23	27/21	21	32/18	6	44/6	21	47/3	18	32/19.5
108. Budget Preparation						18	23	7	25	23	23	21	38/12	13	38/13	21	37/12	21	43/3.5
109. Supervision of personnel	12.5			45/1.5	37/1	15	38/1	18	32/5	23	35/4.5	17	47/1	19	38/13	21	37/12	21	39/8
110. Leadership skills	15			44/3	35/2.5	13	35/2	11	32/5	23	31/9.5	19	42/6	6	31/25	21	47/3	18	39/8
111. Administrative skills	21.5			42/7.5	32/7	15	30/6.5	11	29/14	27	23	23	40/10.5	13	38/13	16	42/8	14	39/8
112. Oral communication	17.5			43/5	31	18	30/6.5	14	29/14	27	23	13	38/12	6	31/25	16	42/8	18	36/13.5
113. Written communication						20	28/11	14	25	27	31/9.5	15	42/6	13	31/25	16	47/3	11	43/3.5
114. Improving employee/employer relations						18	25	18	29/14	19	27/21	21	43/2.5	25	44/6	16	47/3	21	39/8
115. Time management						20	25	7	29/14	23	27/21	11	36/14	19	25	26	37/12	11	29
116. Problem-Solving						20	30/6.5	21	29/14	31	35/4.5	19	28	19	25	21	42/8	14	36/13.5

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APPENDIX H (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WASTEWATER SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 36-116) BY STATE AND VTAE DISTRICTS
(NOTE: The percents and rankings for VTAE districts are based on the total reponses to Form C from personnel working in wastewater systems only and those working in both wastewater/water utility systems)

Wastewater Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N=504)																		
	State					9 - MATC-Milw. N = 27		10 - MPTI N = 51		11 - LTI N = 27		12 - FVTI N = 51		13 - NWTI N = 42		14 - MSTI N = 13		15 - NCTI N = 21	
		Improve Opns.		Pers. Dev.															
	Over-All Rank	W.W. N=301 %/R	Both N=181 %/R	W. W. N=301 %/R	Both N=181 %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R
36. DNR requirements for sampling, reporting, and operation	27.5		40/18			22	11	31	29	41/17.5	33/16	38/3	27	52/4.5	33	31	23	48/7.5	33
37. Certification rules						7	22	20	29	22	26	10	31	12	38	31	0	24	19
38. Characteristics of wastewater						26	15	39/15	27	37/21.5	15	35/8	27	33	36	31	31/16	43/10.5	29
39. Safety	21.5		42/14.5		31/9.5	37/6.5	19	37/18	39/23	56/4	30/20	27	31	36	48/9	62/4.5	23	24	38/13
40. Confined area entry						19	30/18.5	35	35	56/4	11	20	35/18	33	31	62/4.5	23	29	43/12.5
41. Wastewater pumping equipment	6.5	39/9	51/6.5			33/12.5	22	37/18	39/23	52/7.5	22	31/20.5	27	45/11.5	24	54/10.5	23	43/10.5	24
42. Collection systems	6.5		51/6.5			30/18.5	19	31	37	33	22	33/15.5	24	40/17	19	38	31/16	38/18.5	29
43. Collection system maintenance	4		55/4			30/18.5	7	41/10	39/23	33	26	29	24	38/23.5	21	46/20.5	15	29	24
44. Collection systems water hydraulics						26	26	25	39/23	22	19	18	31	31	33	31	23	14	29
45. Plant water hydraulics						22	30/18.5	37/18	27	37/21.5	22	25	35/18	38/23.5	31	23	15	14	29
46. Infiltration & inflow identification	9	40/7.5	50/8.5			22	19	49/2	3[illegible]	48/11	19	49/1.5	16	40/17	38	46/20.5	8	38/18.5	24
47. Lift station maintenance/troubleshooting	1		58/1			26	11	33	47/10	51/7.5	15	37/4.5	20	38/23.5	26	62/4.5	15	24	24
48. Flow measurement	5	42/4	52/5			19	33/18.5	39/15	27	37/21.5	37/14	33/15.5	33/23.5	50/6	26	62/4.5	15	52/4	29
49. Electrical equipment and instrumentation	17.5		43/13			33/12.5	41/5	41/10	37	44/14	30/20	35/8	39/13	33	40/20	46/20.5	23	38/18.5	38/13
50. Industrial monitoring						26	22	43/6	33	26	30/20	35/8	20	36	33	31	31/16	48/7.5	24
51. Industrial pretreatment						22	37/8.5	39/15	31	30	30/20	29	24	40/17	36	23	31/16	48/7.5	29
52. Shock loads & toxicity problems	9	50/1	44/12			37/6.5	26	45/4	27	41/17.5	19	49/1.5	20	60/1.5	24	62/4.5	8	62/1.5	19
53. Primary settling treatment process						22	15	29	20	26	4	25	24	36	24	46/20.5	0	29	19
54. Sludge pumping equipment						41/1.5	15	31	31	30	19	14	37/14.5	33	26	46/20.5	15	19	19
55. Sludge pumping procedures						37/6.5	11	33	24	33	15	24	18	38/23.5	21	46/20.5	8	14	19
56. Mathematical process control calculations						19	22	27	25	33	22	27	33/23.5	24	40/20	46/20.5	23	38/18.5	14
57. Microscopic examination of organisms						26	15	29	35	26	30/20	33/15.5	35/18	36	48/9	31	31/16	29	24
58. Trickling filter process						0	7	22	18	4	11	4	20	12	21	23	8	10	5
59. Rotating biological contactor process						0	11	12	25	7	15	2	25	14	24	15	8	14	5
60. Nitrogen Control						30/18.5	26	33	22	26	19	35/8	29	36	40/20	46/20.5	31/16	33/26	24
61. Activated sludge basics						26	15	31	27	19	19	25	22	31	31	23	15	14	10
62. Activated sludge process control						37/6.5	19	41/10	25	33	19	35/8	24	43/13.5	29	54/10.5	15	33/26	14
63. Oxidation ditches						4	7	8	25	7	15	2	18	12	26	8	0	10	10
64. Package plants						4	11	22	27	19	15	12	20	17	31	0	23	10	19
65. Activated sludge modes of operation						33/12.5	22	29	27	26	26	35/8	24	38/23.5	36	46/20.5	15	10	33/19
66. Blower and aeration equipment operation						26	15	47/3	31	52/7.5	22	33/15.5	27	45/11.5	26	54/10.5	15	33/26	24
67. Stabilization pond operation						4	7	12	24	7	7	8	22	21	29	15	23	24	5
68. Aerated lagoon process						0	7	14	27	11	19	14	22	14	26	23	23	26	5
69. Seepage lagoon						0	8	22	22	4	15	10	20	5	24	15	31/16	14	5
70. Spray irrigation of wastewater						0	11	8	41/17.5	0	11	4	25	2	38	15	38/6	24	29
71. Chlorine disinfection	12.5		45/10.5			33/12.5	19	29	25	41/17.5	11	24	24	48/8.5	31	38	8	29	29
72. Ultraviolet light disinfection	27.5			40/10		4	37/8.5	8	41/17.5	7	19	8	43/10	7	48/9	15	46/1.5	10	33/19
73. Fixed-cover anaerobic digestion						11	15	6	25	15	15	8	27	12	40/20	15	8	10	19
74. Floating-cover anaerobic digestion						11	11	10	25	19	15	14	22	7	38	8	23	10	14
75. Digester gas production and use						15	15	16	27	19	7	14	33/23.5	14	36	23	23	10	19
76. Sludge conditioning						22	33/13	35	25	33	7	31/20.5	25	29	24	38	23	33/26	24
77. Sludge thickening/dewatering						22	30/18.5	35	25	33	7	29	29	31	21	31	38/6	48/7.5	19

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APPENDIX H (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WASTEWATER SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 36-116) BY STATE AND VTAE DISTRICTS
(NOTE: The percents and rankings for VTAE districts are based on the total responses to Form C from personnel working in wastewater systems only and those working in both wastewater/water utility systems)

Wastewater Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N=504)																		
	State					9-MATC-Milw. N = 27		10 - MPTI N = 51		11 - LTI N = 27		12 - FVTI N = 51		13 - NWTI N = 42		14 - MSTI N = 13		15 - NCTI N = 21	
		Improve Opns.		Pers. Dev.															
	Over-All Rank	W.W. N=301 %/R	Both N=181 %/R	W. W. N=301 %/R	Both N=181 %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R	Imp. Opns. %/R	Pers. Dev. %/R
78. Sludge hauling and land application		38/10.5				26	15	37/18	25	33	15	25	22	33	38	46/20.5	8	48/7.5	19
79. Aerobic digestion						11	11	29	24	26	19	24	25	12	40/20	38	8	38/18.5	5
80. Phosphorus removal						19	15	27	24	11	15	25	25	24	31	8	23	14	24
81. Laboratory testing for BOD and suspended solids						11	22	31	22	41/17.5	26	29	24	38/23.5	36	15	8	19	38/13
82. Lab testing for nutrients						15	15	31	29	22	26	25	24	29	38	23	31/16	29	29
83. Fecal coliform and chlorine testing						15	22	29	25	37	22	22	22	29	33	31	0	24	33/19
84. Dissolved oxygen control & determinations	27.5		40/18			19	15	43/5	24	33	22	37/4.5	22	40/17	36	46/20.5	8	33/26	14
85. Laboratory quality assurance		38/10.5				15	22	35	33	48/11	26	33/15.5	27	38/23.5	36	46/20.5	8	57/3	14
86. Laboratory instrumentation						22	22	35	43/13.5	44/14	26	25	29	36	38	46/20.5	0	38/18.5	24
87. Sampling for process control						30/18.5	15	41/10	27	37/21.5	26	24	24	43/13.5	26	54/10.5	15	33/26	24
88. Chemical addition						26	11	37/18	35	30	19	27	29	36	31	38	8	29	14
89. Cold weather operations	2	48/2	57/2			33/12.5	11	55/1	24	48/11	26	31/20.5	35/18	60/1.5	14	62/4.5	8	48/7.5	29
90. Odor control	24.5	41/5.5	41/16			33/12.5	11	37/18	29	33	22	29	27	48/8.5	17	46/20.5	15	62/1.5	19
91. Emergency operations	12.5	41/5.5	45/10.5			37/6.5	15	41/10	29	52/7.5	15	31/20.5	29	57/3	29	46/20.5	31/16	43/10.5	24
92. Physical/Chemical treatment						19	19	24	23	26	22	22	24	38/23.5	31	23	8	29	29
93. Trenching						7	7	14	31	19	7	4	14	12	17	31	15	14	10
94. Corrective maintenance	9	40/7.5	50/8.5			37/6.5	22	33	39/23	56/4	22	33/15.5	27	48/8.5	19	54/10.5	31/16	38/18.5	24
95. Preventative maintenance	3	44/3	56/3			37/6.5	22	43/6	35	63/1.5	22	35/8	29	52/4.5	17	69/1	8	38/18.5	24
96. Energy conservation	27.5		40/18			26	33/13	33	47/10	63/1.5	19	29	29	48/8.5	24	54/10.5	8	43/10.5	29
97. Contract services						7	15	24	33	30	19	16	27	12	38	15	31/16	14	24
98. Use of microcomputers in wastewater operations						41/1.5	22	18	47/10	19	44/5	20	41/11.5	21	43/15	46/20.5	8	29	33/19
99. Management of plant operations and recordkeeping	21.5		42/14.5			37/6.5	19	29	39/23	44/14	41/10	27	33/23.5	40/17	40/20	38	38/6	33/26	33/19
100. Building and ground maintenance						22	7	31	37	19	22	18	25	26	17	38	15	29	19
101. Arithmetic						0	7	6	39/23	7	26	8	29	17	21	15	15	19	5
102. Algebra						0	11	6	37	4	33/16	10	33/23.5	19	26	15	8	10	14
103. Basic Chemistry						4	11	8	43/13.5	11	41/10	12	35/18	21	31	8	15	14	24
104. Electronics	17.5			43/5	31/9.5	11	33/13	20	41/17.5	22	41/10	8	57/2	17	48/9	15	31/16	10	48/7
105. Electricity	12.5			45/1.5	31/9.5	7	41/5	25	43/13.5	19	48/2	8	61/1	12	45/12.5	15	38/6	14	48/7
106. Fluid hydraulics					30/12	11	33/13	27	41/17.5	22	26	10	49/7	14	43/15	8	23	10	48/7
107. Public Relations					33/5.5	7	33/13	25	49/7	26	44/5	12	41/11.5	14	45/12.5	31	38/6	5	52/3
108. Budget Preparation						22	30/18.5	12	41/17.5	26	26	14	27	14	43/15	38	23	14	24
109. Supervision of personnel	12.5			45/1.5	37/1	22	37/8.5	14	53/2	22	41/10	16	49/7	14	62/1	31	15	10	57/1
110. Leadership skills	15			44/3	33/2.5	15	48/1.5	16	53/2	22	41/ 0	14	51/4.5	14	50/6	31	23	10	52/3
111. Administrative skills	21.5			42/7.5	32/7	15	37	12	43/13.5	19	48/2	14	47/9	12	55/2.5	31	23	10	43/12.5
112. Oral communication	17.5			43/5	31	11	44/3	10	53/2	22	44/5	8	55/3	10	52/4.5	23	31/16	10	48/7
113. Written communication						11	41/5	10	51/4.5	24	41/10	10	51/4.5	12	55/2.5	15	38/6	10	48/7
114. Improving employee/employer relations						19	37/8.5	22	51/4.5	22	48/2	25	37/14.5	26	48/9	23	46/1.5	14	52/3
115. Time management						26	30/18.5	16	49/7	26	33/16	14	33/23.5	21	40/20	23	15	10	48/7
116. Problem-Solving						15	48/1.5	16	49/7	30	41/10	12	49/7	17	52/4.5	15	38/6	19	48/7

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APPENDIX H (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WASTEWATER SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 36-116) BY STATE AND VTAE DISTRICTS (NOTE: The percents and rankings for VTAE districts are based on the total responses to Form C from personnel working in wastewater systems only and from those in both wastewater/water utility systems)

Wastewater Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N=504)								
	State					16-Nicolet N = 12		17 - WIT N = 47	
		Improve Oper.		Perm. Dev.					
	Over-All Rank	W.W. N=301 %/R	Both N=181 %/R	W. W. N=301 %/R	Both N=181 %/R	Imp. Oper. %/R	Perm. Dev. %/R	Imp. Oper. %/R	Perm. Dev. %/R
36. DNR requirements for sampling, reporting, and operation	27.5		40/18			42/14	25	19	26
37. Certification rules						25	25	9	23
38. Characteristics of wastewater						50/5	25	26	20
39. Safety	21.5		42/14.5		31/9.5	42/14	33/5	38/6.5	32/8
40. Confined area entry						42/14	8	19	21
41. Wastewater pumping equipment	6.5	39/9	51/6.5			50/5	25	38/6.5	19
42. Collection systems	6.5		51/6.5			42/14	17	28/19.5	19
43. Collection system maintenance	4		55/4			42/14	17	32/13	17
44. Collection systems water hydraulics						25	25	23	23
45. Plant water hydraulics						25	33/5	30/16.5	19
46. Infiltration & inflow identification	9	40/7.5	50/8.5			33/27	33/5	45/2	13
47. Lift station maintenance/troubleshooting	1		58/1			42/14	17	36/9.5	23
48. Flow measurement	5	42/4	52/5			42/14	33/5	40/3.5	19
49. Electrical equipment and instrumentation	17.5		43/13			25	33/5	26	28
50. Industrial monitoring						8	25	19	28
51. Industrial pretreatment						17	25	19	28
52. Shock loads & toxicity problems	9	50/1	44/12			42/14	17	32/13	21
53. Primary settling treatment process						17	33/5	19	21
54. Sludge pumping equipment						50/5	8	23	17
55. Sludge pumping procedures						42/14	8	17	17
56. Mathematical process control calculations						25	17	15	34/4
57. Microscopic examination of organisms						17	25	19	32/8
58. Trickling filter process						8	25	15	17
59. Rotating biological contactor process						8	17	11	17
60. Nitrogen Control						17	25	13	26
61. Activated sludge basics						25	17	17	23
62. Activated sludge process control						33/27	17	17	19
63. Oxidation ditches						8	17	13	23
64. Package plants						8	25	11	26
65. Activated sludge modes of operation						17	25	13	26
66. Blower and aeration equipment operation						33/27	25	32/13	26
67. Stabilization pond operation						25	33/5	36/9.5	9
68. Aerated lagoon process						17	25	26	13
69. Seepage lagoon						8	17	23	15
70. Spray irrigation of wastewater						25	17	21	21
71. Chlorine disinfection	12.5		45/10.5			25	33/5	21	17
72. Ultraviolet light disinfection	27.5			40/10		25	33/5	13	26
73. Fixed-cover anaerobic digestion						25	25	15	13
74. Floating-cover anaerobic digestion						25	25	11	17
75. Digester gas production and use						33/27	17	13	13
76. Sludge conditioning						25	17	19	15
77. Sludge thickening/dewatering						42/14	17	21	19

APPENDIX H (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WASTEWATER SUBJECTS/TOPICS BY AREAS FOR DESIRING TRAINING (Q 36-116) BY STATE AND VTAE DISTRICTS (NOTE: The percents and rankings for VTAE districts are based on the total responses to Form C from personnel working in wastewater systems only and those working in both wastewater/water utility systems)

Wastewater Subjects/Topics	Percent/Rank of Responses by State and VTAE Districts (N=504)								
	State					16-Nicolet N = 12		17 - WITI N = 47	
	Over-All Rank	Improve Oper. W.W. N=301 %/R	Improve Oper. Both N=181 %/R	Pers. Dev. W. W. N=301 %/R	Pers. Dev. Both N=181 %/R	Imp. Oper. %/R	Pers. Dev. %/R	Imp. Oper. %/R	Pers. Dev. %/R
78. Sludge hauling and land application		30/10.5				33/27	8	19	21
79. Aerobic digestion						17	17	13	15
80. Phosphorus removal						17	8	11	11
81. Laboratory testing for BOD and suspended solids						33/27	17	23	30/11.5
82. Lab testing for nutrients						42/14	17	15	21
83. Fecal coliform and chlorine testing						33/27	17	21	17
84. Dissolved oxygen control & determinations	27.5		40/18			17	17	28/19.5	26
85. Laboratory quality assurance		30/10.5				42/14	8	23	23
86. Laboratory instrumentation						33/27	17	21	19
87. Sampling for process control						25	17	28/19.5	13
88. Chemical addition						33/27	25	23	21
89. Cold weather operations	2	48/2	57/2			58/2	17	47/1	21
90. Odor control	24.5	41/5.5	41/16			42/14	25	40/3.5	15
91. Emergency operations	12.5	41/5.5	45/10.5			42/14	17	38/6.5	13
92. Physical/Chemical treatment						17	25	26	17
93. Trenching						8	8	13	17
94. Corrective maintenance	9	40/7.5	50/8.5			58/2	17	32/13	21
95. Preventative maintenance	3	44/3	56/3			58/2	17	38/6.5	21
96. Energy conservation	27.5		40/18			42/14	17	32/13	19
97. Contract services						25	8	15	15
98. Use of microcomputers in wastewater operations						25	25	13	30/11.5
99. Management of plant operations and recordkeeping	21.5		42/14.5			33/27	17	28/19.5	30/11.5
100. Building and ground maintenance						25	17	21	15
101. Arithmetic						17	8	13	17
102. Algebra						17	8	11	15
103. Basic Chemistry						25	8	17	17
104. Electronics	17.5			43/5	31/9.5	25	17	19	26
105. Electricity	12.5			45/1.5	31/9.5	33/27	17	30/16.5	23
106. Fluid hydraulics					30/12	17	8	17	23
107. Public Relations					33/5.5	17	17	23	19
108. Budget Preparation						17	17	19	19
109. Supervision of personnel	12.5			45/1.5	37/1	17	17	13	34/4
110. Leadership skills	15			44/3	35/2.5	17	17	13	34/4
111. Administrative skills	21.5			42/7.5	32/7	25	17	11	38/1
112. Oral communication	17.5			43/5	31	17	17	11	34/4
113. Written communication						17	17	11	32/8
114. Improving employee/employer relations						25	8	15	26
115. Time management						17	25	9	30/11.5
116. Problem-Solving						17	17	15	34/4

APPENDIX I

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WASTEWATER SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 36-116) BY STATE AND DNR DISTRICTS

(NOTE: The percents and rankings for DNR districts are based on the total responses to Form C from personnel working in wastewater systems only and those working in both wastewater/water utility systems

Wastewater Subjects/Topics	Percent/Rank of Responses by State and DNR Districts (N = 504)																
	State					1 - Southern N = 137		2 - Southeast N = 97		4 - L. Mich N = 107		6 - W. Central N = 72		7 - N. Central N = 42		8 - Northeast N = 45	
		Improve Oper		Pers Dev													
	Over-all Rank	W.W. N=301 %/R	Both N=181 %/R	W.W. N=301 %/R	Both N=131 %/R	Imp Oper %/R	Pers Dev %/R	Imp Oper %/R	Pers Dev %/R	Imp Oper %/R	Pers Dev %/R	Imp Oper %/R	Pers Dev %/R	Imp Oper %/R	Pers Dev %/R	Imp Oper %/R	Pers Dev %/R
36. DNR requirements for sampling, reporting and operation	27.5		40/18			31	26	36/20.5	20	44/4	31	36/19.5	18	40/12.5	29/22	22	29/21
37. Certification rules						15	27	11	25	14	34/19.5	13	14	24	19	7	24
38. Characteristics of wastewater						34	24	41/7	19	34/24.5	30	36/19.5	15	36/22.5	31/18	27/19.5	31/13.5
39. Safety	21.5		42/14.5		31/9.5	39/10.5	37/11	40/9.5	35/14	34/24.5	37/15	36/19.5	25/12	40/12.5	31/18	33/9.5	38/7
40. Confined area entry						33	30/27.5	36/20.5	25	28	32/24	19	24	40/12.5	29/22	16	27
41. Wastewater pumping equipment	6.5	39/9	51/6.5			45/9.5	29	41/7	28/23	38/12	26	50/5	18	45/8	26	38/6.5	22
42. Collection systems	6.5		51/6.5			35	26	32	25	36/17	21	38/15.5	17	38/16.5	26	24	24
43. Collection system maintenance	4		55/4			45/9.5	27	38/14.5	22	33	23	40/12.5	15	36/22.5	19	27/19.5	22
44. Collection system water hydraulics						26	33/18	25	29/20.5	23	31	25	15	21	26	20	29/21
45. Plant water hydraulics						29	31/22.5	31	28/23	31	32	29	21	19	26	27/19.5	22
46. Infiltration & inflow identification	9	40/7.5	50/8.5			47/4.5	26	39/12	19	45/2.5	25	35/23.5	17	36/22.5	24	47/1	16
47. Lift station maintenance/troubleshooting	1		58/1			47/4.5	31/23.5	35	26	38/12	22	50/5	22	38/16.5	21	33/9.5	27
48. Flow measurement	5	42/4	52/5			47/4.5	22	36/20.5	32/15	40/8	30	53/2	18	52/3	24	40/4.5	34
49. Electrical equipment and instrumentation	17.5		43/13			43/11.5	31/22.5	38/12	38/9.5	36/17	36/16.5	36/19.5	28/5	36/22.5	33/11.5	24	31/13.5
50. Industrial monitoring						41/15	21	34	21	35/21	25	31	21	31	31/18	18	29/21
51. Industrial pretreatment						35	25	32	25	35/21	28	28	21	29	33/11.5	18	29/21
52. Shock loads & toxicity problems	9	50/1	44/12			44/7.5	23	45/2	22	51/1	21	49/7	19	55/1.5	17	31/13	34
53. Primary settling treatment process						31	16	30	13	29	21	32	15	29	19	18	22
54. Sludge pumping equipment						36	29	33	26	25	29	36/19.5	21	33	19	20	18
55. Sludge pumping procedures						34	23	35	20	32	18	32	18	29	17	13	18
56. Mathematical process control calculations						30	28	27	26	26	34/19.5	29	24	36/22.5	17	13	40/3.5
57. Microscopic examination of organisms						33	28	28	30/18.5	33	38/14	18	21	26	26	18	38/7
58. Trickling filter process						18	19	7	14	7	19	19	13	12	14	11	18
59. Rotating biological contractor process						18	23	11	19	7	23	19	13	12	12	9	18
60. Nitrogen control						35	20	33	21	34/24.5	33/21.5	25	15	29	26	13	29/21
61. Activated sludge basics						22	25	27	22	27	24	26	17	19	14	13	27
62. Activated sludge process control						32	28	38/14.5	21	38/12	24	32	18	40/12.5	17	13	22
63. Oxidation ditches						12	22	11	18	7	21	15	14	10	7	11	24
64. Package plants						11	25	16	20	15	23	17	15	5	21	7	29/21
65. Activated sludge modes of operation						29	28	34	26	35/21	27	22	18	21	26	9	29/21
66. Blower and aeration equipment operation						47/4.5	26	37/16.5	26	38/12	26	51/3	15	36/22.5	21	31/13	31/13.5
67. Stabilization pond operation						15	23	9	9	13	24	25	8	19	19	33/9.5	9
68. Aerated lagoon process						16	20	9	12	13	24	26	7	21	19	22	13
69. Seepage lagoon						13	18	8	12	7	21	19	13	12	19	22	16
70. Spray irrigation of wastewater						4	26	5	16	4	28	21	14	19	33/11.5	20	20
71. Chlorine disinfection	12.5		45/10.5			37/20.5	20	36/20.5	19	34/24.5	26	40/12.5	17	29	24	18	20
72. Ultraviolet light disinfection	27.5			40/10		11	39/8.5	6	31/16.5	9	42/11.5	14	24	12	40/2.5	13	29/21
73. Fixed-cover anaerobic digestion						16	20	10	22	11	30	24	13	14	17	13	16
74. Floating-cover anaerobic digestion						17	22	15	19	13	26	19	15	10	21	11	20
75. Digester gas production and use						22	26	20	18	16	31	29	11	17	24	11	13

APPENDIX I (continued)

PERCENT (%) OF NUMBER (N) RESPONSES AND RANKINGS OF WASTEWATER SUBJECTS/TOPICS BY REASONS FOR DESIRING TRAINING (Q 36-116) BY STATE AND DNR DISTRICTS
(NOTE: The percents and rankings for DNR districts are based on total responses to Form C from personnel working in wastewater systems only and those working in both wastewater/water utility systems)

Wastewater Subjects/Topics	Percent/Rank of Responses by State and DNR Districts (N = 504)																
	State					1 - Southern N = 137		2 - Southeast N = 97		4 - L. Mich N = 107		6 - W. Central N = 72		7 - N. Central N = 42		8 - Northeast N = 45	
		Improve Opns		Pers Dev													
	Over-all Rank	W.W. N=301 %/R	Both N=181 %/R	W.W. N=301 %/R	Both N=181 %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R	Imp Opns %/R	Pers Dev %/R
76. Sludge conditioning						31	26	27	18	33	22	29	14	26	26	20	16
77. Sludge thickening/dewatering						26	29	32	20	31	23	28	18	36/22.5	29/22	24	20
78. Sludge hauling and land application		38/10.5				42/13.5	20	37/16.5	15	30	27	46/8	18	45/8	17	18	22
79. Aerobic digestion						28	21	26	19	19	30	31	13	26	12	18	16
80. Phosphorus removal						12	23	23	18	24	26	13	15	12	21	9	13
81. Laboratory testing for BOD suspended solids						36	18	29	26	33	29	26	24	21	24	22	33/10.5
82. Lab testing for nutrients						26	30/27.5	22	23	26	28	21	25/12	29	29/22	16	24
83. Fecal coliform and chlorine testing						35	25	27	21	26	26	35/23.5	21	26	21	22	18
84. Dissolved oxygen control & determination	27.5		40/18			39/18.5	23	33	22	38/12	27	33	22	33	12	27/19.5	[illegible]/21
85. Laboratory quality assurance		38/10.5				40/16.5	25	36/20.5	22	36/17	30	29	24	50/5	12	27/19.5	24
86. Laboratory instrumentation						40/16.5	30/27.5	34	27	31	32/24	28	21	38/16.5	17	24	20
87. Sampling for process control						37/20.5	21	40/9.5	19	31	24	38/15.5	15	36/22.5	21	27/19.5	16
88. Chemical addition						28	30/27.5	34	20	31	28	31	13	29	19	27/19.5	22
89. Cold weather operations	2	48/2	57/2			58/1	18	43/4	20	43/5.5	25	58/1	11	55/1.5	21	44/2	24
90. Odor Control	24.5	41/5.5	41/16			43/11.5	17	31	26	37/15	21	43/10.5	17	50/5	24	42/3	16
91. Emergency operations	12.5	41/5.5	45/10.5			42/13.5	20	41/7	25	43/5.5	26	44/9	19	38/16.5	29/22	40/4.5	13
92. Physical/Chemical treatment						23	26	27	22	30	25	26	15	19	26	29/15.5	18
93. Trenching						14	23	13	13	8	14	13	11	14	12	13	20
94. Corrective maintenance	9	40/7.5	50/8.5			46/7.5	24	43/4	26	41/7	21	43/10.5	22	45/8	26	21/13	22
95. Preventive maintenance	3	44/3	56/3			49/2	23	51/1	24	45/2.5	21	50/5	25/12	50/5	19	38/6.5	22
96. Energy conservation	27.5		40/18			36	31/22.5	39/12	26	39/9	27	29	22	43/10	21	33/9.5	20
97. Contract services						20	27	19	28/23	16	29	14	10	14	26	13	16
98. Use of microcomputers in wastewater operations						20	34/15	36/20.5	30/18.5	20	42/11.5	19	28/5	31	26	13	29/21
99. Management of plant operations and recordkeeping	21.5		42/14.5			34	34/15	43/4	29/20.5	36/17	36/16.5	39/14	22	33	31/18	27/19.5	31/13.5
100. Building and ground maintenance						26	23	23	20	21	22	36/19.5	13	29	19	20	18
101. Arithmetic						13	31/22.5	5	16	13	25	17	18	14	12	11	18
102. Algebra						12	31/22.5	6	18	14	31	15	18	10	14	9	16
103. Basic Chemistry						17	33/18	11	24	18	33/21.5	17	18	12	19	18	20
104. Electronics	17.5			43/5	31/9.5	20	42/4	24	38/11	12	50/4.5	19	26/8	14	38/4.5	18	29/21
105. Electricity	12.5			45/1.5	31/9.5	22	42/4	24	40/8	9	53/1	25	28/5	17	40/2.5	29/15.5	27
106. Fluid Hydraulics					30/12	18	39/8.5	20	31/16.5	13	44/9	13	22	7	33/11.5	18	27
107. Public Relations					33/5.5	21	36/12.5	19	39/9.5	15	43/10	18	26/8	14	38/4.5	22	24
108. Budget Preparation						18	36/12.5	24	36/13	14	32/24	14	22	21	21	18	22
119. Supervision of personnel (109)	12.5			45/1.5	37/1	18	45/1	24	42/6	15	51/2.5	17	32/1	17	33/11.5	11	40/3.5
110. Leadership skills	15			44/3	35/2.5	16	42/4	22	45/2	14	49/7	13	29/2.5	17	33/11.5	11	40/3.5
111. Administrative skills	21.5			42/7.5	32/7	18	39/8.5	18	41/7	13	49/7	15	25/12	17	33/11.5	9	42/1
112. Oral Communication	17.5			43/5	32/4	13	39/8.5	18	44/4.5	10	51/2.5	17	25/12	14	33/11.5	9	40/3.5
113. Written Communication	21.5			42/7.5	35/2.5	15	41/6	15	45/2	13	50/4.5	17	24	12	36/6.5	11	36/9
114. Improving employee/employer relations	24.5			41/9	33/5.5	20	43/2	23	44/4.5	25	41/13	17	24	17	43/1	16	27
115. Time Management						15	34/15	21	37/12	19	35/18	15	26/8	14	31/18	9	33/10.5
116. Problem-solving skills	17.5			43/5	31/9.5	21	33/18	18	45/2	16	49/7	19	29/2.5	17	36/6.5	16	38/7

APPENDIX J

NUMBER OF WATER UTILITY SUPERINTENDENTS RESPONDING AND PERSONNEL REPORTED

(From Form D)

N=36

VTAE DISTRICTS	Number of Superintendents	Number Of Personnel		Median Number	
		FT	PT	FT	PT
One - Eau Claire	—				
Two - La Crosse	--				
Three - Fennimore	1	1		1	
Four - Madison	2	23	2	8.5	2
Five - Janesville	2	8	4	2	
Six - Kenosha	4	81	10	4 (av=16)	4
Eight - Pewaukee	2	1	1	1	1
Nine - Milwaukee	5	70	6	12 (av=14)	3
Ten - Fond du Lac	5	15	11	2 (av=3)	3
Eleven - Cleveland	2	13	2	13 (av=6.5)	2
Twelve - Appleton	4	16	3	7	3
Thirteen - Green Bay	3	31	5	7.5	2.5
Fourteen - Wis. Rapids	1	10	—	10	—
Fifteen - Wausau	2	8	2	8	2
Sixteen - Rhinelander	1	1	—	1	—
Seventeen - Shell Lake	2	5	5	5	2.5
TOTAL	36	283	51		

Statewide

APPENDIX K

NUMBER OF WASTEWATER SUPERINTENDENTS RESPONDING AND PERSONNEL REPORTED

N=85

VTAE DISTRICTS	Number of Superintendents Responding	Number Of Personnel		Median Number	
		FT	PT	FT	PT
One - Eau Claire	4	18	3	7 (av=9)	1
Two - La Crosse	2	2	2	2	2
#3 - Fennimore	2	7	3	3	3
#4 - Madison	10	80	13	5 (av=8)	1
#5 - Janesville	5	13	6	2	2
#6 - Kenosha	7	68	31	8.5(av=11.3)	2.5(av=4.4)
#8 - Pewaukee	8	38	7	7	3.5
#9 - Milwaukee	5	997	66	70 (av=199)	12.5
#10 - Fond du Lac	8	31	10	4.5	1
#11 - Cleveland	1	2	--	2	--
#12 - Appleton	10	100	6	6 (av=10)	1
#13 - Green Bay	8	43	6	2 (av=6.1)	1.5
#14 - Wis. Rapids	1	12	1	12	1
#15 - Wausau	5	34	5	4 (av=6.8)	1.5
#16 - Rhinelander	3	9	4	9	2
#17 - Shell Lake	6	11	7	2	2
TOTAL	85	1465	170	—	--

APPENDIX L

NUMBER OF SUPERINTENDENTS OF BOTH WATER/WASTEWATER PLANTS RESPONDING AND PERSONNEL REPORTED

N=85

VTAE DISTRICTS	Number of Superintendents	Number Of Personnel		Median Number of Personnel	
		FT	PT	FT	PT
One - Eau Claire	13	81	7	2 (av=8.9)	1.5
#2 - La Crosse	8	15	7	2	1
#3 - Fennimore	10	17	13	1	2
#4 - Madison	6	18	3	2 (av=2.4)	1.5
#5 - Janesville	1	2	2	2	2
#6 - Kenosha	1	—	5	—	5
#8 - Pewaukee	3	4	4	2	1
#9 - Milwaukee	—	—	—	—	—
#10 - Fond du Lac	11	15	21	1	2
#11 - Cleveland	6	18	8	3.5	1
#12 - Appleton	3	3	3	1.5	1
#13 - Green Bay	5	7	4	2	1
#14 - Wis. Rapids	3	3	2	1.5	2
#15 - Wausau	5	67	4	4	1
#16 - Rhinelander	—	—	—	—	—
#17 - Shell Lake	10	26	12	2	1
TOTAL	85	276	95	—	—

APPENDIX N

CURRENT & DESIRED CERTIFICATION LEVELS OF PERSONNEL IN WATER UTILITIES & BOTH SYSTEMS BY VTAE DISTRICTS (Q 14-15) N = 376

Note: N = Number, Ch = Checks, % = percent, based on N and not checks.

Waterworks Subgrades	VTAE One N = 23				WWTI N = 21				SWTI N = 31				Mdsn N = 44				BTI N = 11				GTI N = 13				WCTI N = 24				MILW N = 32			
	Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
G. Groundwater	19	83	2	9	20	95	0	0	30	97	1	3	39	89	4	9	10	91	0	0	10	77	1	8	21	88	1	4	27	84	2	6
D. Distribution	17	74	2	9	17	81	1	5	29	94	1	3	34	77	3	7	10	91	0	0	11	85	1	8	19	79	2	8	24	75	3	9
Z. Zeolite Softening	6	26	1	4	3	14	0	0	1	3	3	10	6	14	5	11	1	9	0	0	5	38	2	15	10	42	2	8	10	31	4	13
I. Iron Removal	7	30	2	9	6	29	3	14	1	3	8	26	7	16	7	16	1	9	0	0	7	54	1	8	10	42	2	8	10	31	5	16
L. Lime Softening	1	4	2	9			1	5			3	10	3	7	3	7			0	0	4	31	2	15	6	25	4	17	8	25	5	16
S. Surface Water	1	4	3	13			2	10			3	10	3	7	4	9			1	9	5	38	2	15	4	17	3	13	13	41	8	25

(continued)

Waterworks Subgrades	MPTI N = 40				LTI N = 19				FVTI N = 30				NWTI N = 20				MSTI N = 12				NCTI N = 14				Nicolet N = 8				WITI N = 33			
	Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.		Already Certi-fied		Would Like Cert.	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
G. Groundwater	31	78	6	15	14	74	1	5	24	80	2	7	19	95	0	0	12	100	0	0	12	86	1	7	7	88	1	13	28	85	3	9
D. Distribution	30	75	6	15	17	89	1	5	25	83	3	10	18	90	1	5	10	83	0	0	12	86	1	7	7	88			28	85	1	3
Z. Zeolite Softening	3	8	10	25	5	26	2	11	13	43	1	3	3	15	3	15	1	8	1	8	0	0	2	14	1	13			3	9	2	6
I. Iron Removal	12	30	12	30	5	26	3	16	10	33	3	10	4	20	3	15	3	25	4	33	1	7	3	21	1	13			3	9	5	15
L. Lime Softening	2	5	8	20	3	16	3	16	7	23	1	3	0	0	3	15	2	17	1	8	3	21	2	14					3	9	2	6
S. Surface Water	2	5	7	18	9	47	1	5	9	30	4	13	2	10	2	10			3	25			4	29					7	21	3	9

APPENDIX N

CURRENT & DESIRED CERTIFICATION LEVELS OF PERSONNEL IN WASTEWATER & BOTH SYSTEMS BY VTAE DISTRICTS (Q 14-35) (N = 504)

(Note: N = Number, Ch = checks, % = percent based on N, not checks)

Wastewater Subgrades	VTAE One N = 40																VTAE WWTI N = 28															
	Certification Grades Current								Certification Grades Desired								Certification Grades Current								Certification Grades Desired							
	1		2		3		4		1		2		3		4		1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction			1	3	1	3	1	3			4	10	1	3	2	5	1	4			1	4					1	4			1	4
A. Primary Settling	12	30	9	23	4	10	11	28			2	5	1	3	3	8	5	18	8	29	5	18	1	4					1	4		
B. Trickling Filter & RBC	11	28	6	15	3	8	10	25	1	3	1	3	1	3	2	5	7	25	6	21	5	18	1	4			1	4				
C. Activated Sludge	8	20	5	13	5	13	9	23	3	8	4	10			3	8	7	25	6	21	5	18	1	4	1	4	1	4	1	4		
D. Stabilization Ponds/Aerated Lagoon	11	28	6	15	2	5	8	20	4	10	4	10	2	5	3	8	10	36	5	18	3	11	1	4	1	4	1	4	1	4		
E. Disinfection	11	28	9	23	3	8	9	23			4	10	1	3	4	10	5	18	8	29	5	18	1	4	1	4	1	4	1	4		
F. Anaerobic Digestion	6	15	8	20	1	3	10	25	1	3	2	5	1	3	3	8	5	18	10	36	3	11	1	4					1	4		
G. Mech. Sludge Handling (Not including hauling/app.)	8	20	4	10	2	5	9	23	1	3	3	8			3	8	6	21	6	21	3	11	1	4								
H. Effluent Filtration	6	15	4	10	1	3	8	20			2	5			2	5	5	18	5	18	3	11	1	4								
I. Phosphorous	6	15	3	8	1	3	8	20	1	3	2	5			1	3	5	18	5	18	3	11	1	4								
J. Laboratory	12	30	9	23	5	13	10	25	1	3	4	10	2	5	4	10	7	25	5	18	4	14	1	4			2	7	1	4		

	VTAE SWTI N = 26																VTAE MATC-MDSN N = 53															
General Introduction	2	8							2	8	2	8	1	4	4	15			3	6	2	4			3	6	2	4	3	6	15	28
A. Primary Settling	7	27	5	19	5	19	2	8			1	4	1	4	6	23	13	25	11	21	10	19	17	32	1	2	1	2	2	4	12	23
B. Trickling Filter & RBC	6	23	3	12	5	19	3	12	1	4			1	4	2	8	12	23	5	9	6	11	18	34	1	2	1	2	2	4	12	23
C. Activated Sludge	6	23	6	23	4	15	4	15	4	15	3	12	1	4	3	12	12	23	11	21	9	17	17	32	1	2	3	6	4	8	13	25
D. Stabilization Ponds/Aerated Lagoon	10	38	5	19	1	4	1	4	2	8	1	4	1	4	1	4	15	28	4	8	5	9	10	19	2	4	1	2	4	8	10	19
E. Disinfection	6	23	6	23	5	19	3	12			2	8	2	8	5	19	11	21	8	15	9	17	18	34	2	4	1	2	2	4	14	26
F. Anaerobic Digestion	6	23	6	23	4	15	1	4			1	4	1	4	5	19	11	21	9	17	9	17	14	26	2	4	2	4	3	6	12	23
G. Mech. Sludge Handling (not including hauling/app.)	6	23	3	12	1	4	1	4			2	8			1	4	10	19	3	6	5	9	11	21	2	4	1	2	2	4	11	21
H. Effluent Filtration	7	27	3	12	1	4	1	4			1	4	1	4	2	8	12	23	3	6	4	8	13	25	2	4	1	2	4	8	11	21
I. Phosphorus	6	23	3	12	1	4	1	4							1	4	12	23	2	4	4	8	9	17	2	4	1	2	1	2	8	15
J. Laboratory	5	19	6	23	3	12	3	12	1	4	2	8	1	4	1	4	10	19	11	21	12	23	15	28	2	4	2	4	3	6	13	25

APPENDIX H (continued)

CURRENT & DESIRED CERTIFICATION LEVELS OF PERSONNEL IN WASTEWATER & BOTH SYSTEMS
BY VTAE DISTRICTS (Q 14-35) (N = 504)

(Note: N = Number, Ch = checks, % = percent based on N, not checks)

Wastewater Subgrades	VTAE BTI N = 16																VTAE GTI N = 19															
	Certification Grades Current Current								Certification Grades Desired Desired								Certification Grades Current								Certification Grades Desired							
	1		2		3		4		1		2		3		4		1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction											2	13	4	25	1	6											1	5	2	11	4	21
A. Primary Settling	4	25	3	19	2	13	4	25	1	6	2	13	3	19	2	13	3	16	2	11	2	11	7	37					2	11	4	21
B. Trickling Filter & RBC	3	19	4	25	1	6	3	19			1	6					2	11	1	5	1	5	8	42					1	5	3	16
C. Activated Sludge	4	25	5	31	1	6	4	25					4	25	2	13	5	26	3	16	2	11	7	37			1	5	2	11	4	21
D. Stabilization Ponds/Aerated Lagoon	2	13	4	25	1	6	3	19	1	6	1	6	1	6	1	6	2	11	1	5	1	5	7	37	1	5	1	5	1	5	3	16
E. Disinfection	3	19	4	25	2	13	4	25			1	6	4	25	2	13	3	16	1	5	1	5	8	42	1	5	2	11	2	11	4	21
F. Anaerobic Digestion	4	25	2	13	2	13	4	25	1	6	2	13	3	19	2	13	2	11	1	5	1	5	8	42			1	5	2	11	4	21
G. Mech. Sludge Handling (not including hauling/app.)	2	13	3	19	2	13	3	19					2	13	2	15	3	16	1	5	2	11	7	37	1	5	1	5	2	11	4	21
H. Effluent Filtration	2	13	3	19	1	6	3	19							1	6	2	11	1	5			7	37					1	5	3	16
I. Phosphorus	2	13	2	13	1	6	3	19									1	5	1	5	1	5	6	32	1	5	1	5	2	11	4	21
J. Laboratory	4	25	[illegible]	38	1	6	4	25			1	6	6	38	3	19	3	16	1	5			3	37	3	16	2	11	2	11	4	21

	VTAE - MCTI N =28																VTAE - MATC-MILW N = 27															
General Introduction							1	4			2	7	2	7	6	21					2	7	2	7			1	4	2	7	9	33
A. Primary Settling	6	21	6	21	5	18	10	36			2	7	3	11	7	25	4	15	5	19	2	7	12	44			2	7	3	11	10	37
B. Trickling Filter & RBC	5	18	6	21	4	14	8	29			1	4	3	11	7	25	2	7	1	4	2	7	10	37			1	4	2	7	7	26
C. Activated Sludge	5	18	8	29	5	18	9	32	1	4	1	4	1	4	9	32	3	11	7	26	4	15	11	41			1	4	2	7	10	37
D. Stabilization Ponds/Aerated Lagoon	4	14	7	25	4	14	6	21	2	7	4	14	4	14	9	32	2	7	2	7	2	7	9	33			1	4	2	7	6	22
E. Disinfection	5	18	10	36	5	18	9	32			2	7	2	7	8	29	3	11	4	15	4	15	11	41			1	4	3	11	11	41
F. Anaerobic Digestion	5	18	7	25	3	11	8	29			1	4	4	14	8	29	2	7	3	11	3	11	10	37			1	4	2	7	9	33
G. Mech. Sludge Handling (not including hauling/app.)	5	18	8	29	4	14	8	29	1	4	1	4	2	7	8	29	4	15	2	7	2	7	12	44	1	4	2	7	3	11	8	30
H. Effluent Filtration	4	14	6	21	4	14	8	29	1	4	2	7	3	11	5	18	1	4	3	11	2	7	9	33			1	4	2	7	6	22
I. Phosphorus	5	18	6	21	5	18	10	36	1	4	1	4	1	4	6	21	3	11	2	7	2	7	12	44			1	4	3	11	9	33
J. Laboratory	5	18	10	36	4	14	10	36			2	7	2	7	8	29	2	7	4	15	3	11	10	37	1	4	2	7	3	11	10	37

APPENDIX N (continued)
CURRENT & DESIRED CERTIFICATION LEVELS OF PERSONNEL IN WASTEWATER & BOTH SYSTEMS
BY VTAE DISTRICTS (Q 14-35) (N = 504)
(Note: N = Number, Ch = checks, % = percent based on N, not checks)

Wastewater Subgrades	VTAE MPTI N = 51																VTAE LTI N = 27															
	Certification Grades Current Current								Certification Grades Desired Desired								Certification Grades Current								Certification Grades Desired							
	1		2		3		4		1		2		3		4		1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction							2	4	3	6	7	14	6	12	14	27			1	4					1	4	1	4	1	4	5	19
A. Primary Settling	19	37	16	31	12	24	10	20	5	10	6	12	6	12	13	25	7	26	6	22	8	30	8	30					2	7	7	26
B. Trickling Filter & RBC	14	27	9	18	12	24	7	14	4	8	8	16	7	14	13	25	6	22	6	22	5	19	5	19	1	4	1	4	1	4	6	22
C. Activated Sludge	15	29	[illegible]	27	11	22	9	18	5	10	8	16	11	22	15	29	8	30	9	33	9	33	7	26					1	4	5	19
D. Stabilization Ponds/Aerated Lagoon	14	27	11	22	7	14	8	16	7	14	10	20	6	12	12	24	6	22	4	15	4	15	6	22	2	7	1	4	2	7	3	11
E. Disinfection	18	35	13	25	11	22	8	16	6	12	8	16	10	20	15	29	8	30	8	30	7	26	8	30	1	4			2	7	6	22
F. Anaerobic Digestion	11	22	9	18	8	16	7	14	4	8	6	12	7	14	13	25	6	22	4	15	6	22	7	26			1	4	2	7	6	22
G. Mech. Sludge Handling (not including hauling/app.)	12	24	4	8	4	8	9	18	7	14	8	16	10	20	13	25	4	15	3	11	5	19	8	30	1	4	2	7	2	7	4	15
H. Effluent Filtration	15	29	7	14	6	12	8	16	5	10	10	20	8	16	13	25	5	19	4	15	5	19	5	19	1	4					5	19
I. Phosphorus	13	25	8	16	5	10	7	14	5	10	9	18	8	16	12	24	5	19	5	19	8	22	6	22			1	4	2	7	7	26
J. Laboratory	19	37	16	31	10	20	13	25	4	8	7	14	7	14	15	29	7	26	7	26	9	33	10	37	1	4	1	4	2	7	5	19

	VTAE FVTI N = 51																VTAE NWTI N = 42															
General Introduction	1	2	3	6	1	2	3	6	1	2	2	4	2	4	5	10	1	2	2	5			2	5	1	2	4	10	4	10	6	14
A. Primary Settling	11	22	12	24	7	14	13	25	1	2	1	2	5	10	9	18	9	21	2	21	5	12	10	24	1	2	3	7	3	7	5	12
B. Trickling Filter & RBC	11	22	11	22	7	14	8	16	2	4	2	4	2	4	7	14	5	12	6	14	1	2	6	14	1	2	3	7	1	2	3	7
C. Activated Sludge	13	25	15	29	7	14	10	20	1	2	3	6	6	12	10	20	10	24	9	21	5	12	8	19	1	2	4	10	3	7	7	17
D. Stabilization Ponds/Aerated Lagoon	11	22	10	20	4	8	6	12			1	2	3	6	6	12	8	19	4	10	1	2	6	14	1	2	2	5	3	7	6	14
E. Disinfection	12	24	15	29	10	20	11	22	1	2	1	2	4	8	12	24	9	21	8	19	2	5	9	21	1	2	2	5	2	5	6	14
F. Anaerobic Digestion	9	18	12	24	7	14	6	12	2	4	1	2	2	4	10	20	4	10	4	10	2	5	7	17	1	2			2	5	6	14
G. Mech. Sludge Handling (not including hauling/app.)	10	20	10	20	7	14	10	20	1	2	1	2	3	6	7	14	6	14	3	7	3	7	10	24	1	2	2	5	3	7	4	10
H. Effluent Filtration	11	22	11	22	4	8	7	14	2	4	1	2	3	6	8	16	4	10	2	5	2	5	8	19	1	2	1	2			3	7
I. Phosphorus	11	22	11	22	6	12	10	20	2	4	2	4	2	4	11	22	3	7	6	14	2	5	8	19	1	2	2	5			6	14
J. Laboratory	12	24	16	31	10	20	15	29	1	2	2	4	5	10	9	18	12	29	14	33	6	14	9	21	1	2	6	14	4	10	9	21

APPENDIX N (continued)
CURRENT & DESIRED CERTIFICATION LEVELS OF PERSONNEL IN WASTEWATER & BOTH SYSTEMS
BY VTAE DISTRICTS (Q 14-35) (N = 504)
(Note: N = Number, Ch = checks, $ = percent based on N, not checks)

Wastewater Subgrades	VTAE MSTI N = 13															
	Certification Grades Current Current								Certification Grades Desired Desired							
	1		2		3		4		1		2		3		4	
	Ch	$	Ch	$	Ch	$	Ch	$	Ch	$	Ch	$	Ch	$	Ch	$
General Introduction					1	8					3	23			2	15
A. Primary Settling	2	15	5	38	3	23	2	15			2	15			3	23
B. Trickling Filter & RBC 2	2	15	3	23	1	8					1	8			2	15
C. Activated Sludge	2	15	4	31	3	23	1	8			3	23			3	23
D. Stabilization Ponds/Aerated Lagoon	2	15	5	38	3	23					3	23	1	8	2	15
E. Disinfection	2	15	4	31	1	8	1	8			1	8	1	8	2	15
F. Anaerobic Digestion	2	15	3	23	2	15	1	8			1	8			2	15
G. Mech. Sludge Handling (not including hauling/app.)	1	8	3	23	3	23	1	8			2	15			3	23
H. Effluent Filtration	1	8	1	8	1	8	1	8							1	8
I. Phosphorus	1	8	2	15	1	8									1	8
J. Laboratory	4	31	4	31	4	31	1	8			3	23	1	8	3	23

Wastewater Subgrades	VTAE NCTI N = 21															
	Certification Grades Current								Certification Grades Desired							
	1		2		3		4		1		2		3		4	
	Ch	$	Ch	$	Ch	$	Ch	$	Ch	$	Ch	$	Ch	$	Ch	$
General Introduction	1	5			1	5	1	5	2	10	1	5			2	10
A. Primary Settling	1	5	2	10	4	19	6	29	1	5	1	5			2	10
B. Trickling Filter & RBC 2	1	5	1	5	3	14	1	5	1	5					2	10
C. Activated Sludge			2	10	4	19	6	29	1	5					2	10
D. Stabilization Ponds/Aerated Lagoon	5	24	1	5	1	5	1	5	2	10	1	5			1	5
E. Disinfection			3	14	2	10	5	24	1	5			1	5	1	5
F. Anaerobic Digestion			1	5	1	5	3	14	1	5						
G. Mech. Sludge Handling (not including hauling/app.)	1	5			2	10	5	24	1	5	1	5			2	10
H. Effluent Filtration	1	5	1	5			2	10	1	5						
I. Phosphorus			1	5	1	5	1	5	1	5					1	5
J. Laboratory			2	10	4	19	7	33	1	5					1	5

	VTAE NICOLET N = 12															
General Introduction	1	8	1	8	1	8					3	25	1	8		
A. Primary Settling	3	25	3	25	3	25	2	17			3	25	1	8		
B. Trickling Filter & RBC	3	25	1	8	2	17	2	17			4	33	2	17		
C. Activated Sludge	2	17	2	17	1	8	2	17			3	25	1	8	1	8
D. Stabilization Ponds/Aerated Lagoon	2	17	1	8	2	17	2	17			3	25	1	8		
E. Disinfection	3	25	2	17	2	17	2	17			4	33	2	17		
F. Anaerobic Digestion	2	17	1	8	2	17	2	17			4	33	2	17		
G. Mech. Sludge Handling (not including hauling/app.)	2	17	1	8	1	8	2	17			3	25	1	8		
H. Effluent Filtration	1	8	1	8	1	8	2	17			3	25	1	8		
I. Phosphorus	2	17	1	8			2	17			3	25	1	8		
J. Laboratory	3	25	2	17	2	17	2	17			3	25	1	8	1	8

	VTAE WITI N = 47															
General Introduction	2	4	1	2					2	4	5	11	3	6	7	15
A. Primary Settling	13	28	11	23	5	11	4	9	2	4	4	9	2	4	5	11
B. Trickling Filter & RBC	14	30	9	19	4	9	3	6	2	4	3	6	1	2	5	11
C. Activated Sludge	15	32	7	15	3	6	3	6	3	6	4	9	2	4	8	17
D. Stabilization Ponds/Aerated Lagoon	15	32	6	13	2	4	2	4	6	13	4	9	3	6	3	6
E. Disinfection	12	26	8	17	4	9	4	9	4	9	1	2	3	6	7	15
F. Anaerobic Digestion	12	26	7	15	4	9	4	9	2	4	2	4	2	4	6	13
G. Mech. Sludge Handling (not including hauling/app.)	13	28	5	11	3	6	3	6	2	4	4	9	1	2	6	13
H. Effluent Filtration	8	17	5	11	2	4	2	4	3	6	4	9			3	6
I. Phosphorus	9	19	5	11	2	4	2	4	2	4	2	4			5	11
J. Laboratory	16	34	6	13	5	11	4	9	2	4	5	11	2	4	6	13

RK/hd
9/10/84

APPENDIX O

CURRENT & DESIRED CERTIFICATION LEVELS OF PERSONNEL IN WATER UTILITIES & BOTH SYSTEMS BY DNR DISTRICTS

(Q 14-15, N = 376) (Percent based on N - not checks = Ch)

Waterworks Subgrades	1 - Southern N = 118				2 - Southeast N = 84				4 - L. Mich. N = 61			
	Already Certified		Would like Certification		Already Certified		Would like Certification		Already Certified		Would like Certification	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
G. Groundwater	103	87	9	8	69	82	6	7	52	85	2	3
D. Distribution	98	83	8	7	66	79	8	10	53	87	4	7
Z. Zeolite Softening	11	9	17	14	28	33	11	13	18	30	4	7
I. Iron Removal	21	18	26	22	30	36	11	13	16	26	7	11
L. Lime Softening	5	4	13	11	18	21	14	17	10	16	5	8
S. Surface Water	6	5	14	12	23	27	15	18	18	30	6	10

(continued)

Waterworks Subgrades	6 - W. Central N = 48				7 - N. Central N = 34				8 - N. West N = 30			
	Already Certified		Would like Certification		Already Certified		Would like Certification		Already Certified		Would like Certification	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
G. Groundwater	44	92	2	4	30	88	3	9	25	83	3	10
D. Distribution	38	79	4	8	28	82	1	3	25	83	1	3
Z. Zeolite Softening	9	19	1	2	2	6	2	6	3	10	3	10
I. Iron Removal	13	27	6	13	5	15	6	18	3	10	5	17
L. Lime Softening	1	2	3	6	5	15	2	6	3	10	3	10
S. Surface Water	2	4	6	13			7	21	6	20	2	7

APPENDIX P

CURRENT & DESIRED CERTIFICAION LEVELS OF PERSONNEL IN WASTEWATER & BOTH SYSTEMS BY DNR DISTRICTS (Q 14-35) (N = 504) (N = Number, Ch = Checks, % = percent based on N, not on Ch)

Wastewater Subgrades	DNR District 1 - Southern N = 137															
	Current Certification Grades								Desired Certification Grades							
	1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction	1	1	3	2	2	1	2	1	7	5	11	8	13	9	31	23
A. Primary Settling	37	27	32	23	26	19	32	23	5	4	7	5	11	8	30	22
B. Trickling Filter & RBC	31	23	20	15	22	16	30	22	5	4	6	4	8	6	24	18
C. Activated Sludge	32	23	33	24	24	18	32	23	7	5	10	7	18	13	31	23
D. Stabilization Ponds & Aerated Lagoons	38	28	24	18	14	10	21	15	11	8	10	7	10	7	22	16
E. Disinfection	32	23	30	22	26	19	33	24	7	5	10	7	16	12	34	25
F. Anaerobic Digestion	29	21	25	18	22	16	26	19	5	4	8	6	12	9	30	22
G. Mech. Sludge Handling (not hauling & application)	27	20	13	9	11	8	24	18	7	5	8	6	12	9	25	18
H. Effluent Filtration	33	24	15	11	12	9	24	18	5	4	8	6	11	8	24	18
I. Phosphorus	29	21	12	9	10	7	19	14	5	4	6	4	7	5	18	13
J. Laboratory	32	23	37	27	25	18	33	24	6	4	10	7	15	11	33	24

(continued)

Wastewater Subgrades	DNR District 2 - Southeast N = 97															
	Current Certification Grades								Desired Certification Grades							
	1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction			1	1	2	2	3	3	1	1	6	6	7	7	24	25
A. Primary Settling	21	22	19	20	19	20	34	35	5	4	7	5	11	8	30	22
B. Trickling Filter & RBC	15	15	12	12	14	14	29	30	2	2	7	7	9	9	23	24
C. Activated Sludge	21	22	25	26	20	21	32	33	3	3	7	7	7	7	29	30
D. Stabilization Ponds & Aerated Lagoons	14	14	12	12	12	12	25	26	6	6	10	10	10	10	23	24
E. Disinfection	19	20	20	21	19	20	32	33	3	3	7	7	9	9	28	29
F. Anaerobic Digestion	14	14	15	15	15	15	29	30	2	2	6	6	11	11	27	28
G. Mech. Sludge Handling (not hauling & application)	16	16	13	13	15	15	31	32	6	6	8	8	10	10	25	26
H. Effluent Filtration	12	12	14	14	12	12	27	28	4	4	7	7	8	8	20	21
I. Phosphorus	15	15	16	16	16	16	31	32	4	4	7	7	9	9	26	27
J. Laboratory	19	20	21	22	16	16	33	34	6	6	8	8	9	9	27	28

APPENDIX P (continued)

Wastewater Subgrades	DNR District 4 - Lake Michigan N = 107															
	Current Certification Grades								Desired Certification Grades							
	1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction	2	2	5	5	1	1	5	5	3	3	7	7	7	7	14	13
A. Primary Settling	25	23	24	22	14	13	27	25	2	2	4	4	9	8	18	17
B. Trickling Filter & RBC	20	19	20	19	9	8	17	16	3	3	5	5	3	3	13	12
C. Activated Sludge	28	26	29	27	14	13	22	21	2	2	7	7	10	9	19	18
D. Stabilization Ponds & Aerated Lagoons	24	22	16	15	5	5	16	15	1	1	3	3	7	7	13	12
E. Disinfection	26	24	27	25	12	11	24	22	2	2	3	3	8	7	22	21
F. Anaerobic Digestion	17	16	17	16	9	8	17	16	3	3	2	2	5	5	19	18
G. Mech. Sludge Handling (not hauling & application)	19	18	14	13	10	9	24	22	2	2	4	4	7	7	13	12
H. Effluent Filtration	18	17	14	13	6	6	18	17	3	3	2	2	3	3	13	12
I. Phosphorus	17	16	18	17	8	7	22	21	3	3	5	5	3	3	20	19
J. Laboratory	28	26	33	31	18	17	30	28	2	2	9	8	11	10	21	20

(continued)

Wastewater Subgrades	DNR District 6 - West Central N = 72															
	Current Certification Grades								Desired Certification Grades							
	1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction	2	3	1	1	2	3	1	1			6	8	1	1	3	4
A. Primary Settling	18	25	17	24	10	14	12	17			4	6	2	3	3	4
B. Trickling Filter & RBC	20	28	12	17	9	13	11	15	1	1	3	4	1	1	2	3
C. Activated Sludge	17	24	11	15	11	15	10	14	5	7	5	7	1	1	3	4
D. Stabilization Ponds & Aerated Lagoons	22	31	11	15	6	8	9	13	5	7	5	7	3	4	3	4
E. Disinfection	18	25	17	24	9	13	10	14	1	1	5	7	2	3	4	6
F. Anaerobic Digestion	12	17	18	25	5	7	11	15	1	1	2	3	2	3	3	4
G. Mech. Sludge Handling (not hauling & application)	16	22	10	14	6	8	10	14	1	1	4	6			3	4
H. Effluent Filtration	12	17	9	13	5	7	9	13	1	1	3	4			2	3
I. Phosphorus	12	17	8	11	5	7	9	13	1	1	2	3			1	1
J. Laboratory	21	29	14	19	10	14	11	15	1	1	8	11	3	4	4	6

APPENDIX P (continued)

Wastewater Subgrades	DNR District 7 - North Central N = 42															
	Current Certification Grades								Desired Certification Grades							
	1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction	2	5	1	2	3	7	1	2	2	5	6	14	1	2	4	10
A. Primary Settling	5	12	9	21	10	24	10	24	1	2	5	12	1	2	5	12
B. Trickling Filter & RBC	5	12	5	12	6	14	3	7	1	2	4	10	2	5	4	10
C. Activated Sludge	3	7	6	14	8	19	9	21	1	2	5	12	1	2	6	14
D. Stabilization Ponds & Aerated Lagoons	8	19	7	17	6	14	3	7	1	2	6	14	2	5	3	7
E. Disinfection	4	10	7	17	5	12	8	19	1	2	4	10	4	10	3	7
F. Anaerobic Digestion	4	10	4	10	5	12	6	14	1	2	4	10	2	5	2	5
G. Mech. Sludge Handling (not hauling & application)	3	7	4	10	6	14	8	19	1	2	5	12	1	2	5	12
H. Effluent Filtration	3	7	3	7	2	5	5	12	1	2	2	5	1	2	1	2
I. Phosphorus	2	5	4	10	2	5	3	7	1	2	2	5	1	2	2	5
J. Laboratory	6	14	6	14	10	24	10	24	1	2	5	12	2	5	5	12

(continued)

Wastewater Subgrades	DNR District 8 - Northwest N = 45															
	Current Certification Grades								Desired Certification Grades							
	1		2		3		4		1		2		3		4	
	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%	Ch	%
General Introduction	2	4	1	2					2	4	4	9	3	7	7	16
A. Primary Settling	12	27	12	27	4	9	4	9	2	4	2	4	2	4	5	11
B. Trickling Filter & RBC	12	27	9	20	3	7	3	7	2	4	2	4	1	2	5	11
C. Activated Sludge	13	29	9	20	2	4	3	7	3	7	4	9	2	4	8	18
D. Stabilization Ponds & Aerated Lagoons	13	29	6	13	1	2	2	4	7	16	4	9	3	7	3	7
E. Disinfection	11	24	10	22	3	7	4	9	4	9	1	2	3	7	7	16
F. Anaerobic Digestion	11	24	8	18	3	7	4	9	2	4	2	4	2	4	6	13
G. Mech. Sludge Handling (not hauling & application)	11	24	5	11	2	4	3	7	2	4	3	7	1	2	6	13
H. Effluent Filtration	7	16	5	11	1	2	2	4	2	4	3	7			3	7
I. Phosphorus	8	18	5	11	1	2	2	4	2	4	2	4			5	11
J. Laboratory	14	31	8	18	4	9	4	9	2	4	3	7	2	4	6	13